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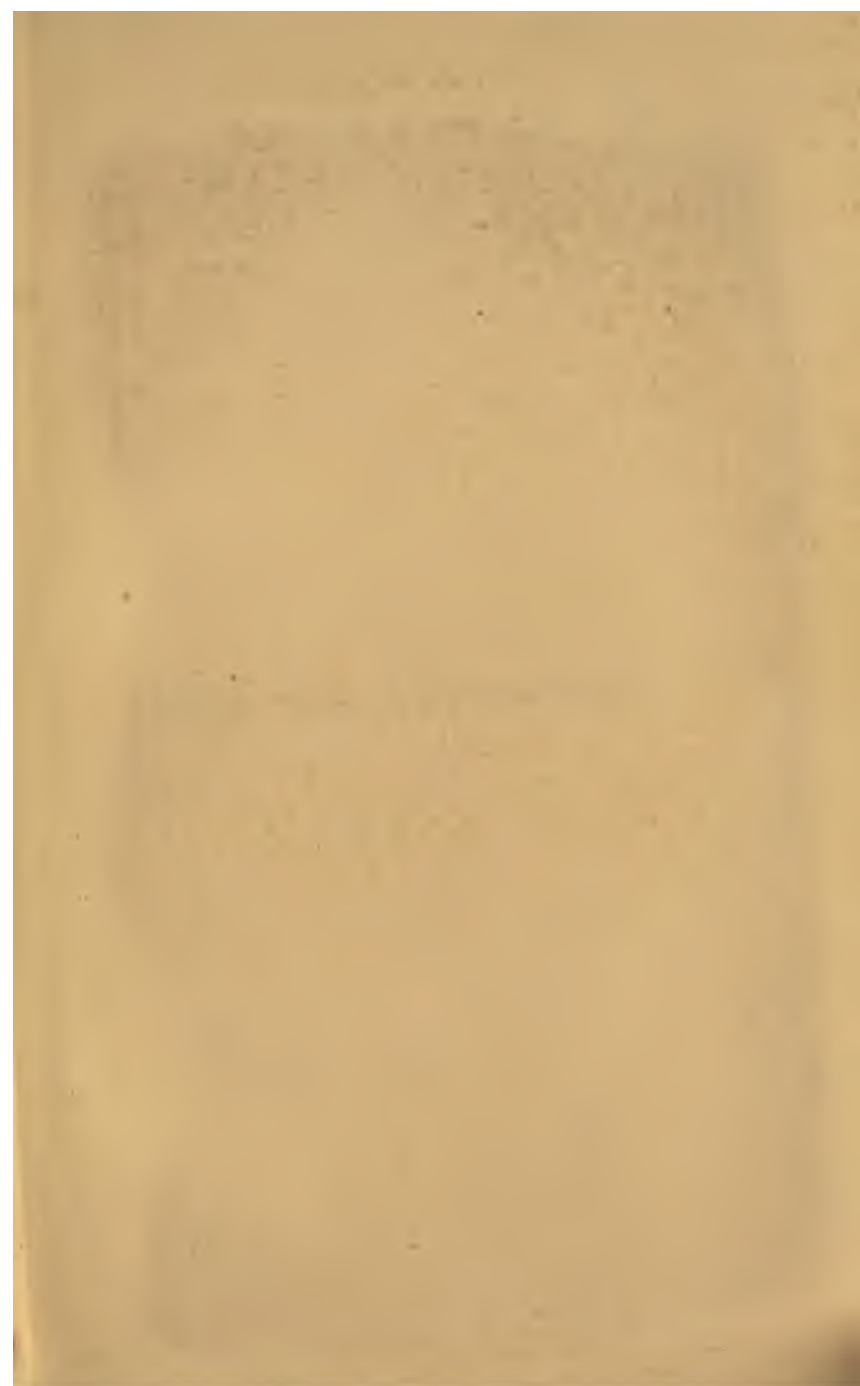
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# INTESTINAL OBSTRUCTION.



*J. H. Perry*

# INTESTINAL OBSTRUCTION.

BY

WILLIAM BRINTON, M.D., F.R.S.

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## PREFACE.

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THE following work is based upon the Croonian Lectures which I had the honour of delivering before the College of Physicians in 1859.

The publicity accorded to these Lectures by the leading Medical Journal, in which they were accurately reported at the time, made me long forego, as unnecessary, any further attempt to promulgate the new doctrines I believed them to contain. But though I was gratified by their receiving the approval of many leading Fellows of our College (among whom I may with excusable satisfaction specify our President, Sir Thomas Watson), and have since had reason to hope that, through the enormous diffusion of the 'Lancet,' they obtained the assent of numbers of my professional brethren, and thus influenced the drift of opinion on the treatment of intestinal obstruction, still repeated inquiries on the part of Medical friends have at length reluctantly convinced me that their republication in a collected form is a duty which I have no right to evade.

In performing this duty, I have incorporated with these Lectures whatever additional information the careful consideration and enlarged experience have brought me during the interval (now almost the Horatian "*nonum in annum*") which has followed their delivery. They are, indeed, almost rewritten; but I have striven to retain them in a brief and condensed form—an object which has, of course, forbidden all attempts adequately to represent the casuistry of the subject. For such brevity, however, I need hardly offer any formal excuses. If any justification were needed, it might be found, not only in the number and bulk of the books which are constantly coming forward to claim professional attention, but still more in the utter hopelessness which every thoughtful Physician will allow attaches to the attempt to depict, by any the most elaborate word-painting, the various aspects and the numberless considerations which pertain to the thorough study of even a single case of disease.

WILLIAM BRINTON.

24, BROOK STREET, GROSVENOR SQUARE;  
*London, January, 1867.*

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## INTESTINAL OBSTRUCTION.

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Introduction—Kinds of obstruction—Mechanical obstruction—Typical case—Fæcal vomiting—Anti-peristaltic view—Arguments against it—Explanation of fæcal vomiting—Modifying circumstances—Stages of obstruction—Symptoms of first stage—Distension—Fluctuation—Movements of Intestine—Pain: two kinds—Constipation—Nature of second stage—Symptoms—Paralysis—Inflammation—Rupture—Collapse.

THE term “intestinal obstruction” connotes with tolerable accuracy the class of cases to which it refers: a class made up of varieties very diverse in their origin and nature, but having this common feature—that, in all, the symptoms are caused mainly by an obstruction to the transit of contents through some part of the intestinal tube.

Such obstruction is usually understood to be due to a mechanical barrier, blocking up the calibre of the tube by a substance which, whether formed by the walls or the contents of the intestine, or by some extraneous mass, more or less completely closes its channel. And to this interpretation of the word there is in itself little objection, both from its harmonizing with the primary (and, indeed, almost exclusive\*) use of the Latin word it renders into

\* Even the less frequent and literal uses of this word by Latin authors imply the idea of hindrance to the passage of an obstructed body, by virtue of a possession on the part of the obstructing one, and not by a mere arrest.

English, and from its really constructing, for the group of cases to which it refers, a true pathological distinction.

Nevertheless, it is necessary carefully to limit and define the accuracy of this term, before proceeding to use it as an ordinary appellation for the cases which we are about to consider. Nay more, we cannot rightly understand either their true import, or their relations to other and kindred maladies of the intestine, without explicitly recognising that the meaning we thus attach to the word "obstruction" is somewhat arbitrary—that this particular kind of interruption to intestinal transit is, at any rate, rather a circumstantial, than an essential, feature of the malady in which it occurs. Constituting in most cases a very convenient and practical distinction, it nevertheless fails us, in some at their very outset, in many more during the progress of the disorder, while in all it is ultimately overlaid by a development of symptoms which are very unlike (if not opposite) in their nature to those characteristic of mere mechanical occlusion of the bowel. For example, such a paralysed state of the bowel as is incidental to a local enteritis of some intestinal segment only, can produce all the symptoms of obstruction in the segments above or behind the inflamed point, and with an intensity quite predominating over the inflammatory symptoms. Nor would the mere admixture of inflammation, even supposing it always discernible, form any real distinction, inasmuch as it sooner or later enters largely into the symptoms of purely mechanical occlusion.

Somewhat akin to the paralysis of enteritis are the various instances in which the natural solid contents of the bowel, not being forwarded by due peristalsis through any particular segment of the tube, constitute, at this point,



an obstacle which the active propulsion\* of the contents accumulated above it are quite unable to overcome. Again, these cases, related by one extreme to many forms of ordinary constipation, merge, by increasing severity, and through the various degrees of inflammatory action already hinted at, into that sheer destruction of the life and continuity of tissue which is involved in suppuration, gangrene, and ulceration. The latter condition does indeed afford quite a typical illustration of the ambiguity occasionally attaching to the term "obstruction," in that precise and accurate meaning referred to above; inasmuch as a circular ulceration of the bowel, acting only as a solution of continuity, sometimes produces a complete (if intermittent) obstruction, absolutely indistinguishable in all its symptoms from the simple mechanical obstruction caused by an ordinary annular stricture.

It is therefore necessary to premise that, whatever meaning we may conveniently, and in the main accurately, attach to the term "obstruction," the state itself, in so far as it consists in a hindrance to the passage of intestinal contents, may depend on two different, and in some sense contrasted causes; which, however they may mix with and merge into each other in the casuistry of intestinal disease, must be carefully distinguished. The fact that transit through the bowel is impeded sufficiently shows the inadequacy of those forces which should effect it. But this inadequateness itself may be due to either of two conditions—to a failure of propulsive energy on the one hand, or to an excess of resistance to such energy on the other. And, in respect of this alternative, the intestine does but exemplify a law which holds good for all tubes

\* Of which propulsion the accumulation here of intestinal contents is, of course, sufficient proof.

propelling their contents by their own muscular contractions. In all tubes of this kind, that more obvious obstruction which is producible by the occlusion of their calibre from without, by the impaction of their contents, or by the contraction of their own walls, has its counterpart in the obstruction produced by a mere failure of propulsive force, by the weakening, the paralysis, or the destruction of their walls; and therefore by injury of their nerves, inflammation of their tissues, or even by any solution of continuity in their muscular coats.

No better illustration of these two kinds of obstruction could be adduced than that which is furnished by experimental physiology. By tying the lower end of the œsophagus of a healthy rabbit we produce an obstruction analogous to the well-known obstruction of œsophageal stricture in the human subject. Any food swallowed, and not immediately brought back by the contraction of the tube, accumulates behind the obstruction, distending this segment of the canal into a pouch as it is gradually propelled downwards from the pharynx, and thus stretching out the œsophageal walls of this part in spite of their muscular contraction, which it slowly overcomes, and finally paralyses. If, in another rabbit, we simply divide the œsophagus by a clean transverse incision, we bring about an analogous result, differing chiefly in the circumstance that the distension above the solution of continuity is lessened by an escape of a variable quantity of food from the upper surface of the wound. In that counterpart of this experiment which may sometimes be seen as a sequel\* to ligature of the intestinal canal in animals, and which I have known to occur as annular ulceration in the human bowel, this complication is absent, and the distension of

\* Compare p. 19.

the tube above its division scarcely differs from that producible by a ligature or an ordinary stricture.

Lastly, if, in a third rabbit, we divide both the pneumogastric nerves near their origin, and thus artificially paralyse the œsophagus, the resulting accumulation of \* food not only amounts to an obstruction, but becomes sometimes so great as to threaten the suffocation of the animal; and thus forms what is virtually an obstacle no way less complete or dangerous than a ligature.

Some would, perhaps, suggest that these two forms of obstruction might be conveniently distinguished by applying to the one, and withholding from the other, the epithet "mechanical." But the propriety of such an epithet seems very doubtful, inasmuch as the impediment caused by a mere failure of contractile power is, strictly speaking, quite as mechanical as any physical obstacle impacted in the bowel. It therefore appears to me better to recognise the true relation of the two, than vainly to search after words; to which, after all, we should have to assign a new and arbitrary meaning, in order to render their use of any real service. Hence we may recognise at the outset that, in many forms of intestinal obstruction, the physical obstacle is from the very first enhanced by local embarrassment or failure of peristalsis; that in rare instances, it is exclusively due to such want of propulsive energy; that in almost all instances, the later stages of that mischief which is brought about by such obstruction afford abundant evidence of a more diffuse paralysis, itself amounting to a further increase (or at any rate upward displacement) of the original stoppage. Conceding all these points, and deferring their due consideration to a more fitting occasion, there can be

\* Such an animal, under these circumstances, often eats greedily, and swallows (as to the pharynx) easily.



little objection to our using the term intestinal obstruction in its ordinary sense, as signifying a class of cases of which the characteristic symptoms are due to an obstacle mechanically impeding the passage of contents through the bowel. And in treating of those cases it will be convenient successively to consider—(1) The Pathology of intestinal obstruction generally. (2) Its chief varieties. And (3) The Principles of its Treatment.

#### PATHOLOGY.

The succession of symptoms typical of intestinal obstruction may be sketched as follows :

A person, perhaps hitherto healthy, experiences a sudden constipation, attended with disproportionate uneasiness or flatulence, soon merging into pain and distension of the belly, with violent rolling movement of the intestines. The distension increasing, nausea and vomiting supervene ; and, gradually becoming more frequent, end by rejecting, not merely any casual alimentary contents of the stomach, or the greenish, bilious, alkaline fluid commonly thrown up when this organ is unoccupied by food, but a fluid of greater opacity, colour, and consistence, with a distinctly faecal odour. A further aggravation of these symptoms now conducts the malady to its termination. This, if fatal, is usually preceded, locally, by signs of paralysis, inflammation, or even rupture of the distended bowel, and, constitutionally, by exhaustion or collapse replacing a febrile reaction. In other cases, the obstacle being removed by Nature or Art (if by the former, rarely before life is in extreme danger), the symptoms subside with comparative celerity. The pain, distension, and vomiting cease ; the bowels are relieved by copious stools ; and the patient (if

not placed in further peril by any of those conditions incidental or consecutive to obstruction just hinted at) is rapidly restored to comparative health.

In discussing these symptoms, it may be advisable so far to deviate from the above succession as to begin with that which is, in many respects, the most remarkable of them all, namely, *faecal vomiting*. Long known to be pathognomonic of intestinal obstruction, and explained by a doctrine which had reigned almost unquestioned from the days of Galen, it is not for me to assume that the refutation which (in the opinion of some of the best authorities) this doctrine received at my hands many years ago is sufficiently known to require no further allusion. And any such necessity of exposing an important error in the pathology of obstruction can hardly be regretted, since it calls special attention to a symptom which is so intimately related to all the other phenomena of the disease, as to constitute a clue to their occurrence, and a measure of the completeness and simplicity (as well as situation) of the obstacle itself.

It was formerly supposed that *faecal vomiting* was effected by an anti-peristaltic movement of the intestinal canal; that, at a certain stage of intestinal obstruction, the natural peristaltic action of the bowel above the occluded point was reversed; so that, instead of proceeding towards the anus, or lower outlet, as heretofore, it took the contrary direction; thus impelling the intestinal contents in a similarly retrograde course, so as to return them to the stomach, whence they were vomited. Vomited, it would seem, in the opinion of some authorities, by a prolongation or continuance of the same anti-peristalsis backwards through the pylorus to the cardia: in the opinion of others, by an action of this kind, only differing from the



reversed movement of the bowel in its having the stomach for a second starting-point.

In opposition to this theory, however, I advanced, nearly twenty years ago, the following considerations :

1st. Amongst the numerous writings\* which affirm an anti-peristalsis, there is not one which substantiates its occurrence. The supposed movement has never been observed, far less seen to concur with obstruction, and to produce fæcal vomiting.

2nd. In vivisections of animals in whom the intestine

\* The above sentence adequately sums up all the results of a long and toilsome search through a large number of authors, many of whom wrote in a Latin, of which the style and language are as distasteful to a scholar, as its sense is irrelevant and inconclusive to a physician, of the present day. In most instances, the *à priori* reasoning in favour of an anti-peristalsis seems to have overruled all strict observation and inference. Some, therefore, are contented to assert the doctrine. Others find in the confessedly slight and irregular movements of the exposed intestines of animals—movements "*nunc sursum, nunc deorsum*"—sufficient evidence of such a definite reversal of the natural action. Others, finding the bowel tranquil under similar circumstances, deny to the intestine, not only any anti-peristalsis, but also any peristalsis, and refer the natural propulsion of the contents of this tube exclusively to the contractions of the abdominal muscles. Finally, among the more circumstantial and authentic observations in support of the occurrence of an anti-peristalsis we may notice one, which well deserves a place in any future collection of '*Nugæ Pathologicae*.' The case refers to a young lady, who, in an attack supposed to be "*ileus*," vomited a suppository within a few minutes after its introduction into the rectum. Another such suppository, which had been cautiously secured by a string, was soon vomited in the same manner, the string having been broken by the violence of the anti-peristaltic movement. Warned by the failure of this single cable, the wary observers tied down the third suppository by four ligatures, which, two and two, were made to encircle the thighs of the patient, being firmly knotted around them. In a very few minutes, however, the four strings were broken, and the suppository, torn from these apparently safe moorings by what must have been a perfect hurricane of anti-peristalsis, was again cast forth from the patient's mouth, giving oral evidence of the most convincing, though silent, kind to the existence of this movement.

has been artificially obstructed for some days, its movements are seen to be more evidently and uniformly peristaltic than in the normal state, owing to an increase in the energy of the movements themselves—an increase such as may be generally verified in the obstructed intestine of the human subject, by inspection and palpation of the belly.

3rd. An anti-peristalsis is supposed to be caused by an over-irritation at the obstruction, inverting\* the natural action of the bowel. Hence irritation is regarded as the first link in the chain of its causation. Now, we can scarcely name any other morbid state of the bowels in which an over-irritation is not present; or show any deficiency in the degree or kind of irritation associated with many intestinal diseases, such as would, on this view, exclude or prevent an anti-peristalsis. But while the alleged cause is thus a common incident of intestinal disease, the alleged effect—fæcal vomiting—is not only rare, but is strictly limited to instances of obstruction of the tube. Hence the mechanism of the process must be sought, not in any chain of causation begun by mere irritation, but in the single fact—obstruction—which is at least its conditioning cause.

4th. The necropsy of cases of obstruction positively refutes the notion of an anti-peristalsis. No matter how many days fæcal vomiting may have lasted before death—that is, no matter how long the anti-peristaltis alleged to cause this vomiting must also have preceded that event—an inspection of the obstructed bowel always affords irre-

\* "All substances which, when their action is moderate, promote the peristaltic motions of the irritated parts, by a more violent operation cause those motions to become reversed."—Mueller's 'Physiology,' translated by the late Dr. Baly.



fragable evidence that the general direction of the intestinal movement, and the general course of the intestinal contents, has been onwards to the obstructed point, and not backwards from it. In other words, though an anti-peristaltic movement, lasting ten or twenty days in succession, and rolling backwards the contents of the bowel with frequent and violent muscular writhings (such as can be felt through the wall of the belly), ought to have rendered the calibre of the intestine at least uniform throughout, if not greatest at the duodenal end towards which the movement had set, the necropsy always shows a condition precisely the reverse of this. That part of the bowel which is supposed to be the chief and original seat—the starting-point—of the inverted action (namely, the obstruction), evinces the least proof of its having occurred, and is by far the most distended segment of the whole tube; so that the intestine, tapering away from this broad base upwards or backwards towards the duodenum, forms a kind of cone, and generally dwindles to comparative or absolute emptiness before reaching the pylorus (see Figs. 3, 4). Its appearances are, in fact, closely akin to those seen in any other distensible tube (such as a gall-duct or ureter), the fluid contents of which have been actively propelled by its own contractions towards a strangulated point.

5th. While the supposed anti-peristalsis might fairly be expected to extend, like the irritation causing it, beyond the occluded point, both observation and experiment show that, long after the occurrence of obstruction, the bowel at and below the occluded point often empties itself by propelling its contents in the normal direction. So that, on the theory of an anti-peristalsis, a single irritation applied to a given part of the bowel renders it the starting-point of two precisely opposite movements—one upward towards

the stomach, one downward towards the rectum. And while, as above noticed, the first of these supposed movements not only fails to empty the segment it starts from, but always permits its extreme distension; the last, on the contrary, often empties and contracts its corresponding segment of the intestine to a tube with a thick wall and a narrow calibre, like the stem of a tobacco-pipe (*a*, Fig. 3).

6th. A comparison of the symptoms and appearances in some cases of obstruction affords a specific disproof of all anti-peristalsis above the occluded point. In spite of the persistence of fæcal vomiting, castor oil, crude mercury, and other substances easily identified, which have been taken into the stomach shortly before death, are shown by the necropsy to have traversed the whole intervening length of intestine, to be stopped only by their reaching the strangulation itself.

Hence the notion of an anti-peristalsis was contradicted, not only by direct observation, but by those collateral circumstances which ought to have afforded scarcely less valid proof of its occurrence. On the other hand, a careful study of the phenomena of intestinal obstruction, as witnessed in the human subject, and as artificially produced in experiments on animals, led me to the following theory:

The movement proper to the healthy intestine is a circular constriction or peristalsis, which, travelling slowly and intermittently down its muscular wall, propels its contents in a direction from the stomach towards the anus. And when any part of the intestine has its cavity obliterated by an immovable mechanical obstacle, its contents, propelled by such a peristalsis, are stopped at the obstructed point. Here they gradually accumulate, so as first to fill, and then to distend, a variable length of the canal, with a more or less liquid mass. But a peristalsis,

engaging the wall of a closed tube filled with liquid, and falling short of obliterating its calibre, sets up two currents in that liquid: one at the surface or periphery of the tube, having the direction of the peristalsis itself, and one in its centre or axis, having precisely the reverse course. Those particles of the liquid which are in contact with the inner surface of the tube are propelled onwards by the muscular contraction of its wall. And this propulsion is necessarily accompanied by a backward current in those particles which occupy the axis or centre of the canal.

For example, let Fig. 1 represent an inflexible closed tube, filled with liquid, and fitted with a perforated septum, capable of moving freely along its interior. Let such a

FIG. 1.



FIG. 2.



septum be moved towards the closed end of the tube, and it not only propels some of the contiguous particles of liquid in the same direction, but also exerts a pressure on the whole mass of liquid contained there. The pressure



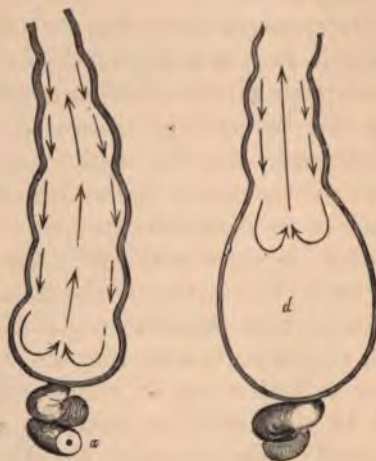
being equal in all directions, part of the liquid escapes backwards through the central orifice of the septum. This backward current is constantly lengthened as the septum advances towards the closed end of the tube. And the slow successive movement of a series of such septa (Fig. 2) would establish two continuous currents in the liquid contents of the tube—a peripheral of advance, and a central of return, to and from its closed (or obstructed) end respectively.

It is scarcely necessary to say that such a model differs in many respects from a living intestine; and that the substances occupying the latter tube at its obstructed point would in no case be returned towards the pylorus, unmixed and unaltered, along the mathematical axis of the bowel. Many circumstances indeed concur to interfere with the exactness of those two currents in the obstructed bowel. Among such we may notify the flexible and elastic character of its walls, the variable intensity, rapidity, and frequency of their muscular contractions, the peculiarities of the mesenteric arrangements, and the continued movements both of the belly and of the body generally. Even in the inflexible model, it would depend upon a variety of details—especially on the length of the column of liquid, the number and width of its septa, and the rapidity and energy of their movements—whether the forward and backward currents would constitute two distinct streams, separated from each other by a comparatively motionless interval of liquid, or whether they would be broken up in effecting a uniform and intimate mixture of the whole contents of the tube. And of course any considerable approach towards a solid consistence of the intestinal contents would *pro tanto* interfere with their circulation; chiefly, however, in the sense of postponing it until the

incidents of intestinal obstruction—the addition of liquids effused or secreted by the canal and its appendages, or taken into it by drinking—had diluted the contents to the necessary degree of mobility. But no matter how imperfect, irregular, or confused the two currents might be, it is evident that the tendency to establish them would be so

3.

FIG. 4.



*Diagrams to illustrate the peristalsis of an obstructed bowel.*

FIG. 3.—Stage of moderate distension, with forward and backward currents, as indicated by the arrows, traversing the whole tube above the obstacle. *a*, contracted segment of intestine below the obstacle.

FIG. 4.—Stage of extreme distension, in which, *d*, the dilated and paralysed segment above the obstacle, is scarcely engaged by either of these currents.

far effective, as that the protracted and energetic peristalsis which is so characteristic an element of intestinal obstruction would of necessity result in that condition which chiefly requires explanation in faecal vomiting—namely, in

such a mixture of the contents of the intestine, as allows some of them to return from a lower, to a higher, segment of this tube (Fig. 3).

The facts and the theory of fæcal vomiting may, therefore, be thus associated. In most cases of intestinal obstruction, the patient vomits matters evidently fæcal. The appearance of these matters, and the subsequent necropsy, often conclusively show that they have traversed a certain length of intestine in a direction towards the stomach; that they have returned, for example, to this organ from an obstruction seated in the lowest part of the ileum, or even in the colon. This reflux is the result of the intestinal peristalsis; which, acting on an obstructed and distended bowel, not only effects the ordinary propulsion of its contents towards the obstacle, but also gives rise to what is, theoretically, a backward current in the liquids occupying the centre of the tube; practically, a *tendency* to such a current. However interfered with by other movements, abdominal or intestinal, this tendency has sufficient energy to effect a more or less intimate mixture of the intestinal contents; and to return some of them from the obstructed part, to a higher segment of the canal: generally, indeed, to the duodenum or stomach, whence they can be expelled by vomiting.

Amongst the circumstances which modify this process are the following:—1. The dilatibility of the obstructed bowel; which, on the one hand, by yielding to the pressure of peristalsis, delays and opposes the axial current; while, on the other (since the intestine acquires much of its increased width at the expense of its normal length) it diminishes the length through which this current has to extend in order to provoke the fæcal vomiting. 2. The paralysis which, sooner or later, results from increasing



distension, removes, as it were, to a higher point of the bowel, the end of that peristaltic movement, which defines the point of reflection of the superficial current, or the commencement of the axial current in the fluid intestinal contents (above *d*, Fig. 4). 3. In the large intestine, the presence of hardened fæces above the obstruction seems sometimes to have a temporary effect of the same kind; the impacted mass forming a secondary obstruction, to and from which the peristalsis, and its reflected current, respectively tend. A somewhat less solid consistence of the matters originally present at the obstructed part, may also suffice to prevent, or at any rate to defer (see Fig. 4), their transmission backwards towards the duodenum. Lastly, the vigour, frequency, length, and duration of the peristaltic movements of course influence the establishment of these opposite currents; and the completeness of that mixture which is their chief practical result. From reasons of this kind, the ingestion of frequent and copious draughts of water by an animal with an obstructed intestine, is sometimes associated with a vomiting so immediate and energetic, as to return this liquid from the stomach or duodenum, scarcely altered save in its having acquired a greenish bilious colour; and certainly devoid of fæcal odour, as well as of any considerable admixture with intestinal contents, such as are afterwards found at the obstruction.

But, besides the above modifying circumstances, it is important to notice some which, though scarcely to be verified in experiments on animals, greatly influence the intestinal obstructions of the human subject. First amongst these is the situation of the obstruction. When the obstacle engages the small intestine, the date at which fæcal vomiting follows obstruction appears to have a general

(though, for obvious reasons, inexact) relation to the length of intestine which intervenes between the obstruction and the stomach. The lower the obstacle in the bowel, the longer is the segment of intestine to be distended, as well as the path thereafter to be traversed by the returning liquids; and, therefore, the later the faecal vomiting which they excite on reaching the stomach. But when the obstacle engages the large intestine, this law applies more exactly; partly from the longer path through which the contents of the bowel have to flow back; partly, I believe, from the slower and more intermittent peristalsis proper to this segment of the digestive tube.

A further cause of delay is also present in these cases; and its mechanism (hitherto overlooked in the consideration of this subject) appears to offer an independent disproof of the anti-peristaltic theory, as well as a strong argument for the views which I have suggested.

It has been known for centuries that the ilio-cæcal valve, constituting, as it does, an arrangement which has the special office of preventing the contents of the cæcum from returning into the ileum, is, nevertheless, traversed by these contents in a backward direction during obstruction of the large intestine. The marked faecal characters—the odour, solidity, and even form—of these contents, have been recognised in the substances vomited from the mouth by patients thus affected. Now, it is manifest that no mere anti-peristalsis could evade the obstacle formed by this valve, and nullify its office by propelling faeces from the cæcum into the ileum; that any attempt at such a process, however co-ordinate or continuous, would completely obliterate the ilio-cæcal aperture, and thus prevent all reflux through it. Nothing, in fact, can mediate such a transit, save extreme distension of both those adjoining

segments of the bowel—cæcum and ileum—which communicate through the valve. And this distension, which receives a good illustration from the inflated and dried specimens (Fig. 5) of the valve seen in anatomical museums, and which may always be traced in the necropsy

FIG. 5.



Cæcum inflated, dried, and laid open, to show the result of extreme distension on the ileo-cæcal valve.

ca. Cæcum. ve. Vermiform appendix. i. Ileum. v. Ileo-cæcal valve.

of cases where obstruction of the large intestine has given rise to fæcal vomiting, enforces upon the valve a patulous state, which places the whole intestine (small and large) down to the obstructed point, in the same condition (as regards its movements, and the currents they impress on its contents) as the obstructed small intestine. The only differences which can be detected in the history and necropsy of a series of such cases in the two divisions of the intestinal canal, are the following:—In obstruction of the large intestine, the great distension requisite to fill the lower end of the ileum, and so to throw open the ileo-cæcal valve, often defers the access of fæcal vomiting to a late



period of the malady; indeed, if the obstructed point be far below the valve, the time occupied by the gradual distension of that segment of bowel intervening between the ileum and the obstruction may prevent the occurrence of the symptom during the whole course of the malady, or life of the patient. And the same distension, by tending to paralyse the bowel, may also interfere with the completeness (or distinctness) of the return of *fæces* from the *cæcum* or colon. Lastly, the more solid consistence of these *fæces* may, as already suggested, further oppose that circulation (or, at any rate, admixture) which is necessary to their traversing the long tube that intervenes between the obstruction and the pylorus.

In close relation to *fæcal* vomiting as a symptom of intestinal obstruction is a fact which deserves special notice, from its affording a clue to many of the pathological details of the whole course of the malady. Whether we look to experiments in animals, or to observations in Man, we shall find the following proposition (which for its importance we may almost call a law) constantly holding good. Excluding the rarer accidents of the obstructed state, the rapidity of death depends greatly on the degree and rapidity of that distension which the obstruction brings about: in other words, the fatal event is, in general, hastened or deferred, according as inflammation, secretion, and ingestion, together fill (quickly or slowly, completely or incompletely) the segment of intestine above the obstructed point.\*

\* The truth of this proposition is deducible from any comparison of a number of cases of obstruction by disease in the human subject; whatever the modifications which age, nation, and idiosyncrasy, impress on these, as on other morbid states. But it is much more easily, because simply, verified in experiments on healthy animals. In dogs and cats, for example, in whom the intestine has been artificially tied, not only is the result of the experiment evidently governed by this law, in so far as that the

From such a consideration of the mechanism of faecal vomiting, we may divide the ordinary course of intestinal obstruction into two stages: of which the first modifies, but yet in some sense continues, the healthy actions of the bowel; while the second arrests (and, in the majority of instances, utterly and permanently annihilates) them. The first, with all its abnormal incidents—pain, distension, vomiting, and writhing peristalsis—corresponds to a period when the obstructed bowel is not only capable of recovery, supposing the obstacle removed, but is engaged in a steady continuous struggle against that obstacle. The second is connected with the development, in the intestine, of lesions which are generally irreparable, and are scarcely less threatening to life by the constitutional injury they imply. The mere paralysis of the obstructed bowel, once fully developed, sometimes render any subsequent removal of the obstacle of little avail towards the re-establishment of the intestinal functions.\* The enteritis and peritonitis process by which the lesion is effaced and healed is rarely or never accomplished where much distension has at any time been present; but even where, failing this process, the lesion proves mortal, the same relation may be traced. One animal drinks eagerly, distends its stomach, vomits frequently, and dies in a day or two. Another, to all appearance in exactly the same state of health, drinks little, distends but slightly, vomits not at all, and lives for almost as many weeks. On killing such an animal, I have found the intestine completely shut by the ligature and occupied by faeces scarcely distinguishable in quantity and consistence from what may be found in the same part of the bowel during health.

\* There can be no doubt that either this paralysis, or the nervous lesion it expresses, is one of the circumstances which render postponement of the operation for strangulated hernia so fatal as it notoriously is. There are probably few hospital surgeons who have not seen cases in which, in spite of its most skilful and successful performance, the operation has not been followed by any relief from the bowels; and the necropsy has shown the intestine, though freed from all mechanical obstruction, still retaining its strictured form, and still distended above this point by its accumulated faecal contents.



which generally follow this state are even more directly fatal; and may be regarded as adding, to the phenomena of obstruction, those of diseases which are scarcely more deadly from the vital organs they involve, than from the prostration and collapse they produce in the system at large.

Among the symptoms of the first stage is one which claims precedence, not only because it has the importance of a physical sign—a morbid change which can be verified during life—but because its value has not hitherto received a due recognition. For though many are acquainted with the exactness of observation attainable by the aid of percussion and palpation in lesions of the belly, these aids to diagnosis are still so far underrated, as that some who apply them sedulously and successfully in thoracic maladies, seem not to derive from them all that scarcely less accurate and useful information which they afford in abdominal disease. By careful examination of this kind through the yielding wall of the belly, that abnormal *distension* of the intestine, which we have found to be a condition of faecal vomiting, may be detected in its very origin, and traced in all its successive stages. And, considering that this sign is not only far more conclusive than any mere symptoms (such as pain, tenderness, nausea, or even vomiting), but that it may often be verified before they have become prominent, it is difficult to exaggerate its importance. Experience entitles me to assert, that the accumulation of intestinal contents immediately above the obstructed point may sometimes be detected, as a slight fulness to palpation, and a much more definite dulness to percussion, where many of the other indications of obstruction are scarcely perceptible, or even absent. Indeed, I have been thus enabled to decide on the existence, and even the situation, of an

obstruction, when there has been no pain or vomiting, no constipation; when the obstruction has occurred suddenly, in the course of a severe diarrhœa; and even when the distension of a few loops of small intestine has been obscured by tympanitic dilatation of the neighbouring colon.

Many years ago, I was called to see a middle-aged female who had been suffering two or three days from a violent attack of English cholera. The last liquid stool had been passed but six or eight hours before I saw her. But after three hours of comparative quiet, the twisting umbilical pain of the malady had returned, as well as the vomiting which had accompanied it; both, however, with diminished severity. The medical gentleman in attendance thought the patient's aspect suspicious; the more so, that she had long suffered from a small femoral hernia. On examining the belly, I found the lower part of the left iliac fossa occupied by what was evidently small intestine, filled with liquid. The hernia (on the same side) was quite painless when handled, and had the doughy feel suggestive of omentum. It was irreducible: a fact upon which the patient laid no stress, as it had often been so before, for many weeks at a time. I could only recommend a careful attempt at the reduction of the hernia, under the influence of a warm bath, aided by opium or chloroform; and, failing immediate success from these, an operation. In accordance with the latter suggestion, she underwent the operation in little more than fourteen hours from the time of passing the last of a series of choleraic stools, and recovered without a single bad symptom: a recovery which, considering all the circumstances, must be ascribed, I think, to the early date of the operation, scarcely less than to the skill of the operator.



Unwilling as I am to cite cases, in other respects not uncommon, I venture to give another illustration of that obscurity of symptoms, and distinctness of signs, which form (so to speak) our bane and antidote respectively in the diagnosis of intestinal obstruction. A young gentleman of seventeen had been the subject of an easily reducible inguinal hernia for about twelve months. During this time, over-exertion had, once or twice, brought on attacks of pain and constipation, subsiding in a day or two. About three days before I saw him, he had been seized by a similar (but more severe) attack, at the outset of which he had with difficulty succeeded in reducing the hernia, without at all checking the increasing severity of his symptoms. I found him suffering from great pain, which was referred solely to the navel and neighbouring part of the epigastrium, and was unattended by any distinct tenderness of the belly near the site of the hernia. He was feverish, and his pulse was quicker than usual; though this latter symptom was rendered less characteristic by serious disease of long standing in the aortic valves. Vomiting was infrequent; and the watery and bilious fluids it ejected were not traceably fecal. Nevertheless, from the peculiar character of the pain, and still more, from the dulness (and, I almost thought, fluctuation) verified in the right iliac region, just above the seat of the hernia, I had no doubt that there was an obstruction, probably connected with the neck of the sac. But the eminent surgeon whom I met in consultation thought that the symptoms were due to a colic independent of the hernia, and that any operation was as yet uncalled for. The vomiting in a few hours became stercoraceous; and, without here dwelling on the medical treatment adopted, I will only add that, after this symptom had lasted about ten days, the patient's



state began to improve, and he finally recovered, with—what proved the accuracy of my diagnosis—a radical cure of the hernia. It is not uninteresting to add, that it was only three or four days after the sudden and marked improvement of the symptoms that he passed the first faecal evacuation; and that this evacuation, a large and solid one, could be distinctly traced in the sigmoid flexure of the colon, by a physical examination of the belly, before it was removed by a repetition of the enema, hitherto in vain administered for the purpose.

*Fluctuation* is, I believe, rarely to be verified in the earliest stage of intestinal obstruction. To fill any length of the colon requires so great and unnatural a quantity of liquid here—to dilate the small intestine, to a width permitting a definite thrill of its liquid contents on percussion of the belly, requires so great a lateral expansion of this bowel (in which liquid naturally accumulates first in the direction of its length)—that fluctuation is rarely an aid to early diagnosis. The bulk of liquid is usually too small to allow of undulations such as can be propagated through the various substances intervening between it and the surface of the belly.

The *movements* of the obstructed intestine afford a better (because an earlier) aid to the diagnosis of the obstructed state. Obesity is of course capable of securing their appearance on the exterior of the belly; but, unless excessive, it rarely prevents their recognition. And although, as already mentioned, protracted and vigorous movements of this kind are soon succeeded by the obstructed segment of the bowel first becoming distended, and then lapsing into such a state of exhaustion as paralyses its muscular coats, still their presence, as a diagnostic mark, is not so much prevented, as transferred to some neighbouring and higher

segment of the intestine (Fig. 4, p. 14). Hence, with few exceptions, these movements may be traced in the walls of the belly covering the affected tube, until the access of that collapse which immediately ushers in the fatal event.

When fully developed, the characters of these movements scarcely allow them to be mistaken. Even at the very outset of an intestinal obstruction, the patient's attention is sometimes called to the peculiar noise and movement which attend what might otherwise be confounded with the ordinary *borborygmi* produced by mere flatulence. To this characteristic variety of a common incident, soon succeed less noisy, but more violent, movements of the intestine; during which it rises visibly against the wall of the belly, in coils that may be fancifully compared to those of a writhing serpent. As the distension of the canal increases, these movements become more marked; and are often so distinctly seen through the stretched and attenuated wall of the belly, as to allow the observation of a definite peristalsis in the intestine beneath it. And even when, at a later period of the disease, the paralysed intestine has ceased to offer any of these active movements, the aid they furnish to diagnosis is often replaced by the exactness with which the distended bowel is mapped out on the abdominal parietes; the swellings answering to the tube itself being thrown into relief by hollows, which correspond to the intervals of adjacent loops of bowel. Rarely do the signs of one or other of these degrees of distension fail us, except where some of the accidents or consequences of obstruction have added their own diagnostic character:—where tympanitis, for instance, has alike relaxed both the intestines and the belly; or peritonitis has shielded the bowel from all physical examination, by interposing a layer of fluid; or, lastly, rupture of the intestine has suddenly



effaced the symptoms of mere obstruction, and plunged the patient into a state of prostration, which is the harbinger of death.

A few months ago I was consulted in a case, in which the diagnosis (as is not infrequent in the early stage of the malady) turned chiefly on the presence of slight degrees of the foregoing signs. A gentleman of about sixty-five, who had previously enjoyed good health (with the exception of a doubtful fever thirty years before), but had lived rather freely, and had once or twice experienced attacks of constipation, lasting not more than a day or two, became the subject of a kind of vague intestinal dyspepsia, which was attended by violent borborygmi; and which, though at first it allowed his bowels to be relieved by ordinary aperients, gradually lapsed into constipation. When I first saw him, this state had lasted nearly a week, in spite of all that the skill of his medical attendants could suggest. On examination, I found the large intestine was traceable, as an empty and dilated tube, from the sigmoid flexure backward to the cæcum: an observation which was perhaps confirmed by the considerable length of flexible tube previously introduced into the rectum; but was much more definitely certified by the very large enemata administered, and by the scanty and scybalous stools which these had brought away. The small intestine formed a packet within the horse-shoe concavity of the colon: it was rendered dull to percussion by an abnormal quantity of contents, but was little distended. A trifling increase of both these characters, near the right iliac fossa, as well as an occasional feeling of pain (or rather weight) here, afforded grounds for referring the obstruction to this region. A slight (but perceptible) rolling movement in the intestinal coils beneath the wall of the belly, and a somewhat

less distinct peristalsis, creeping slowly for an inch or so before subsiding, left me no doubt that the case was one of obstruction, at or near the lower part of the ileum. Under appropriate treatment, the patient survived to the seventeenth day of the obstruction—a delay which, prolonging, as it did, chiefly that comparatively painless state in which he lay when I first saw him, not only increased, however ineffectually, his chances of recovery, but gave him an invaluable opportunity for settling his complex affairs.

The *pain* of intestinal obstruction is closely related, both in its nature and amount, to the circumstances which constitute those varieties of this condition hereafter to be noticed. At present we need only distinguish two chief kinds of pain, which, though associated in most instances of obstruction, are essentially independent of each other. They are, indeed, produced by different causes, and belong to different stages of the disease. And hence, one may casually be found to the exclusion of the other, or may habitually predominate in any particular variety of obstruction.

There can be no doubt that in most of the varieties, as well as cases, of obstruction, the symptoms begin with pain; which is sometimes sudden and violent, and still oftener rises to great intensity in a very short space of time. As regards its character, there is nothing to distinguish it from the pain of enteritis. It is little affected by any pressure short of a deep and forcible impulse on the obstruction; and, with all its violence, remains tolerably distinct, both from the kind of pain which succeeds it, and from the well-known burning tenderness of peritonitis. Pathologically, it is certain that it often follows the occurrence of the obstruction with a rapidity and



suddenness suggesting an interval of scarcely more than a minute or two; and that, other things being equal, its amount and duration vary with the degree of that local injury which is associated with the production of the obstructed state; so that—to anticipate some of the details of the next Lecture—it is usually intense in intus-susception, and in the impaction of gall-stones; somewhat less marked in the obstruction produced by twisting of the bowel, or by bands and adhesions; scanty in the obstruction of stricture; and almost absent in the obstruction caused by the impaction of fæces in the large intestine.

The physiology of intestinal pain generally, as well as the study of the various degrees of obstructive pain just alluded to, concur in referring this abnormal sensation chiefly to derangements in the blood-vessels of the obstructed part. Contrasting, for example, the pain produced by the mechanical injury of a part within the domain of common sensation, with that excited by a similar lesion in a part where (as in the intestine) sensation of this kind is altogether abnormal, we may find a distinction in the fact, that while the first immediately follows the injury, the second only succeeds it after an appreciable (though short) interval of time. And while the anatomy of obstruction constantly affords evidence of that extreme disturbance which the neighbouring circulation undergoes, even in the earliest stages of the process, the arrangement of the sympathetic nerve with reference to the vessels thus involved suggests that, from this coincidence, we may deduce a relation of cause and effect. When, for instance, we find that a soft cylindrical fibrinous band, possessing so little cohesion as easily to tear asunder by the slightest tractile force, can, nevertheless, by pressing on the free margin of a polished flexible tube like the small intestine,

speedily give rise to a pain, which, in the course of one or two minutes, heightens into downright agony; when we find that such a symptom is often followed by the detection, in the dead body, of vivid congestion, accurately defined by this band, and even of large extravasation in the neighbouring mesentery or omentum; when we further consider how predominant a proportion (to say the very least) the nerves distributed to vessels form of the total nervous mass pertaining to the abdominal viscera—we can scarcely avoid the conclusion, that the vessels themselves mediate this pain; and that it is to their distension—whether as a merely physical, or (as is more probable) a vital and nervous act—that we must ascribe the intense suffering which soon follows the sudden occurrence of a mechanical obstruction.

The second variety of pain is, on the whole, the more frequent and characteristic of the two. For while the preceding is shared by enteritis, and is, as it were, only incidental to obstruction, this belongs exclusively to the obstructed state, and is linked, in a chain of closest dependence, with its characteristic phenomena. It is, indeed, the pain of intestinal distension. As such, it follows (and almost measures) that state of unnatural fulness which gradually obtains above the obstructed point. And hence it not only varies with the degree of that general accumulation which involves the whole of the upper segment of intestine, but its paroxysmal character—the remittent (or even intermittent) throes with which it comes on every few minutes, in visible coincidence with the peristalsis of the bowel—points to a closer and more immediate relation of the same kind. Perhaps some would suggest that these paroxysms of pain are caused by undue muscular contraction of the intestinal wall; and are, in so far, analogous to



a cramp of the leg. But since the paroxysmal character is often present when the peristalsis, though more visible, seems scarcely more energetic than usual; and even appears to be most marked when extreme distension has already paralysed the intestine for some distance above the obstruction; it may be more plausibly referred to the great and sudden increase of distension effected by the pressure of peristalsis on that mass of liquid (Fig. 4, p. 14) towards which it sets. In consonance with such an explanation, these paroxysms are sometimes aggravated by the movement of breathing.

Whether this variety of pain is, as respects its mechanism, more nervous, and less vascular, than the foregoing, it little avails us to inquire. The two kinds of pain may, indeed, be identical in this respect. But, fully conceding the depth and frequency of the vascular changes which mere distension tends to bring about, the phenomena of slighter intestinal disorders, and a consideration of that thorough and energetic displacement which extreme distension applies to every constituent tissue, nervous as well as vascular, of the intestinal wall, throw doubts on such an identity, if, indeed, they do not outweigh the evidence in its favour.

As the disease advances, this variety of pain becomes less prominent, and is gradually obscured by the more continuous and uniform pain produced by local inflammation. In spite of the increasing distension of the obstructed bowel, the recurrence of the rhythmic intestinal contractions ceases to correspond with the paroxysms of the pain. The peristalsis intermits for periods of increasing duration; and returns with a constantly decreasing energy. The patient's sufferings, instead of remitting, offer scarcely any variation in severity. And, finally, though the local lesions

which usually precede death, sometimes, by their very depth and extent, render his last hours a period of comparative ease, it is, I think, more common for the agony of the disease to be rather obscured and hidden, than really removed, by the prostration and collapse which announce its close.

The symptom of *constipation* need not be dwelt upon here. We have already noticed that a complete occlusion of the bowel is not incompatible with the emptying of its lower segments by an ordinary act of defecation. Those real variations in this symptom which involve some scanty transit of the intestinal contents through the obstructed part, will be noticed in the next Lecture.

The second stage of intestinal obstruction is distinguished from the first by two chief features: of which one—the failure of intestinal contraction—may be regarded as developed out of the previous excess of muscular movement, in the form of that exhaustion into which such excess naturally merges, while the other superadds, to the phenomena previously present, those of an enteritis or inflammation of the obstructed bowel, having all the diverse contingencies of this state seen in idiopathic enteritis.

It is probable, however, that this distinction is in some degree an arbitrary one: that the paralysis and dilatation which are most obviously and naturally explained as an exhaustion of the muscular actions of the bowel are also, in many cases, related to vascular and nervous changes, themselves brought about by the obstruction, and inaugural to effusion and to the other signs of the inflammatory state. Such a probability becomes apparent when we consider the successive stages of idiopathic enteritis, and find this very state of dilatation and paralysis at once the most marked characteristic of inflammation in the living



bowel, and the best (indeed, the only) explanation of that enlargement of calibre which is the most constant peculiarity observed in this disease after death.

In any case, we may distinguish three leading phenomena in the second stage of intestinal obstruction: paralysis, and inflammation, in the bowel; ushering in collapse of the system at large.

All the signs and symptoms of obstruction concur to show that, for a certain period immediately preceding the fatal termination of this state, the segment of bowel next above (or behind) the obstacle is usually bereft of all power of active contraction. The remittent character which has hitherto distinguished the pain disappears; the waves of violent contraction which accompanied these throes of suffering are no longer discernible in the wall of the belly; the relaxation of the belly and the bowel effaces the projections by which the more distended parts of this tube were mapped out; and lastly, even if there be any perceptible increase in the size of the abdomen, the increasing distension is usually either shared by all the various abdominal regions, or chiefly applies to those hitherto least affected, instead of (as heretofore) telling chiefly upon those parts of the belly which contain and adjoin the obstructed segment of the intestine. This tube, and the cavity which encloses it, gradually merge into a state of relaxation and quiescence—in one word, of utter stagnation and paralysis.

It can hardly be questioned that (as above stated) the distension by which this paralysis is visibly preceded constitutes its chief cause; that the contractility of the unstriped muscle which forms the wall of the intestine is gradually exhausted and destroyed—firstly, by the unnatural energy and protraction of its movements, and

secondly, by the undue stretching it undergoes. The latter element of this muscular paralysis seems comparable, in all but the rate of its access, to the effect seen in a well-known experiment, in which the contractility of a striped muscle (the gastrocnemius of a frog) is instantaneously and permanently annihilated, from its being suddenly stretched by a weight dropped into a scale attached to its extremity.

On the other hand, clinical evidence seems equally conclusive as to the share often taken by causes independent of mere exhaustion or distension in bringing about the paralysed state of the bowel. Often, for example, preceding excessive distension, or replacing peristaltic efforts of a duration and an intensity falling far short of the long and violent writhings of the intestine usually witnessed, it sometimes seems almost to anticipate the complete establishment of both the peristalsis and the distension, much more of any exhaustion presumably due to a protraction of these two states. Analogous (or rather identical) facts are sometimes verified in the obstruction of ordinary hernia.

A hernia, for example, has been skilfully relieved of all strangulation by the knife, and yet the patient has died with the bowel above the previous stricture distended with fæces. And just as, in such a case, the passive contraction present in that part of the bowel corresponding to the seat of the strangulation would necessarily have been overcome by the application of an active contraction to any part of the mass of distending liquid—is overcome, indeed, in a moment, by the slightest attempt at dilatation in the dead body—so the same lesson is occasionally taught by the histories of obstacles in the large intestine, where the constricted part has been penetrated by a bougie or elastic tube, and an enema thus introduced into the dilated

segment above, without any relief to the obstruction, or any delay of its fatal issue.

*Pathology*  
The *inflammation* into which this paralysis merges by a continuance of the obstruction, appears to affect the three coats of the bowel—serous, muscular, and mucous—in somewhat different degrees, in the several varieties of the process. As regards the simpler kinds of obstruction, a dark, sloughy, or gangrenous state of the submucous areolar tissue is perhaps the most frequent and striking result of such inflammation met with in necropsies. This state, which is often associated with great extravasation, is explained by the anatomy of the areolar tunic, and especially by its laxity, and by the dense network of arteries and veins which it encloses. But, long before the access of any such sloughing, the free surface of the mucous coat is the seat of a croupy exsudation, consisting chiefly of an abortive cell-growth formed by its altered epithelium. Softening and ulceration, or even sloughing, of its whole thickness in various parts, are the next changes to occur; and may be seen, to a variable extent, in most fatal cases. The muscular coat, thinned as it is distended, is obscured and lost by the extravasation and sloughing in which it is involved with the adjacent submucous areolar tissue. The peritonitis by which the serous coat shares this inflammation has an import depending chiefly on the inflammatory process set up; which, according as it is adhesive or suppurative, greatly modifies the sufferings of the patient, and the rapidity of his death. Large effusion of liquid is rare; and, as seen in examinations after death, is sometimes partially due to the changes which accompany, or immediately succeed, this event. The same suggestion also applies to the accident of rupture, which, though it has been sometimes unmistakably seen to occur during



life, and has even been known to be immediately brought about by incautious manipulation of the abdomen of the sufferer, is, I believe, far more frequently completed after death, as an incident of incipient putrefaction, or even of the necropsy itself. In the thinned, softened, pulpy condition to which, before death, inflammation often reduces the obstructed bowel, it requires but a very slight increase of the intestinal gases, and a very inconsiderable progress towards the putrefactive dissolution of the tissues of the corpse, to give that increase of pressure, and decrease of consistence, which respectively effect and permit the bursting of the bowel. The detachment of those pasty adhesions which are often thrown out so as to prevent or circumscribe a rupture or perforation during life, may be brought about in the same way; and is a contingency which, taken in conjunction with the foregoing, and with the possible mechanical rupture of the intestine, in even the most careful post-mortem examinations, reduces the real frequency of this occurrence, as an event or termination of intestinal obstruction, to something considerably less than the records of this state would suggest.

The *collapse* which usually ends the fatal cases of obstruction is too complex a product of its various stages and incidents to be summed up by any common description. It may anticipate, and prevent, the development of both stages. In its worst form, it gradually merges into delirium, ending in coma. In milder degree, it often allows the sufferer to retain full possession of his intellect to the last, the moment of death being unannounced by any of the symptoms usually preceding this event. The latter variety of collapse, which is shared by so many other diseases of the abdominal viscera, is sometimes independent of any severe inflammatory lesion of the bowel; and hence



appears to be producible solely by the pain and distension which constitute the chief symptoms of the first stage of obstruction. And, in correspondence with such an explanation, experience shows that this form of collapse, however severe or complete, does not forbid all chance of the patient's recovery, if the obstruction be removed by any of those means, natural or artificial, which will be subsequently noticed.

## LECTURE II.

### THE CHIEF VARIETIES OF INTESTINAL OBSTRUCTION.

Frequency, absolute, relative. Intus-susception: in the dead, in the living, subject. Its nature; locality; age; sex; causes. Its anatomy and progress; in the (*a*) small intestine; (*b*) in the ilio-cæcal, (*c*) the colic, varieties. Their length; position in the belly; mechanism; duration. Symptoms. Differential diagnosis of the two chief varieties. Remaining varieties; share of obstruction in them. Obstruction of small and large intestine contrasted. Two groups of obstructions chiefly affecting these segments. First group: bands; diverticula; vermiform appendices; rents in mesentery; gall-stones. Second group: strictures; twistings of bowel.

IN the preceding Lecture, I attempted briefly to enunciate the pathological laws which govern the process of intestinal obstruction generally. In the following Lecture it will be my object to review the group of maladies, in which this process occurs, from a more strictly clinical aspect; in order to the distinguishing of the different members of this group from each other. But this object—the diagnosis of the chief varieties of obstruction—will oblige me, not only to sum up the symptoms characteristic of each, but, here and there, to render these symptoms more connected and intelligible, by sketching the pathological changes to which they are due, as deduced from a series of necropsies. And I need hardly say, that it permits me to eliminate from my subject the large and important class of obstructions comprised in the term “ruptures”—a class which, in respect to both its diagnosis and its treatment, appertains specially to the surgical branch of our profession.

From an analysis of about 12,000 promiscuous necropsies, I venture to conclude that the group of obstructions thus formed by the exclusion of hernia causes about one in every 280 deaths from all diseases indifferently.

From about 600 necropsies of such obstruction, I conjecture that its chief varieties have to each other the following proportionate frequency:—Intus-susceptions or invaginations, 43 per cent.; obstructions by bands, adhesions, diverticula, or peritoneum, external to the bowel,  $31\frac{1}{2}$  per cent.; strictures (including a few tumours) involving the intestinal wall,  $17\frac{1}{2}$  per cent.; torsion of the bowel on its axis, 8 per cent.

But I cannot make even this limited use of the vast materials I have collected and examined, without adding that, statistically, they are too incomplete to be quite trustworthy. We shall, indeed, by-and-by, notice facts which sustain the conjecture that, according to the age, and even the sex, of its inmates, the promiscuous necropsies of any large hospital would include the first and last of these four groups, in very different proportions to each other; and would therefore afford a somewhat different estimate of their total or aggregate frequency. While it is only on diagnostic—that is, on practical—grounds, that I can defend the pathological confusion (if not cross-division) which is implied in the above grouping.

#### INTUS-SUSCEPTION.

And first, as respects the intus-susception which is the most frequent of all the above lesions. It is well known that intus-susception of the intestine is often found in the dead bodies of comparatively young and

well-nourished subjects. Such displacements, preceded by no symptoms, and accompanied by no lesions, are evidently due to the irregular contractions of the last agony, or to the rigor mortis of the dead intestine. They are easily reduced by traction, and may be exactly imitated by compressing a piece of intestine, and carrying it into another piece immediately adjacent. And there can be no doubt that they are caused by the intense (and yet discordant) action of the transverse muscular coat of the bowel; which, like the finger in the above experiment, pushes the portion of bowel it constricts into a neighbouring relaxed portion.

In the vast majority of cases, the intus-susceptions which give rise to characteristic symptoms during life are forward (that is, consist of the protrusion of an upper into a lower segment of bowel), and single;—both in the sense that only one is present in the whole canal, and that, in this one, the inner and outer segments are continuous by a single intervening portion.

The exceptions to both these rules are very few; I should conjecture scarcely more than one or two in every hundred cases of intus-susceptions hitherto recorded. As respects the first rule, indeed, I ought to own that I am sceptical as to the accuracy of even the very small number of exceptions recorded; and remain at present in doubt whether any backward intus-susceptions—that is, any pushings of a segment of bowel into a segment above or behind it—ever occur at all. The strangely disproportionate number of the forward intus-susceptions is of course in itself no argument against the possibility of another, however diverse, variety. But, considering the relation of an ordinary intus-susception to that healthy peristalsis of the bowel of which it is a perversion and offshoot, the utter



absence of all evidence of that antiperistalsis to which a backward intus-susception would be an analogous casualty, raises grave suspicions against the isolated and doubtful cases on record. Nor is it invidious to notice the singular difficulties which often beset necropsies of intestinal obstruction—the twistings, displacements, adhesions, putrefaction, rupture, effusion, which often tax all the skill and patience of an accomplished anatomist to interpret and unravel; and claim (be it honestly said) far more of these qualities than are to be generally expected in the students or junior officers of hospitals to whom such duties are often entrusted, or even in the hard-working practitioner. For want of the unusual care thus suggested, I have known the upper end of a bowel mistaken for the lower, and the casual and irregular intus-susceptions of the *rigor mortis* regarded as lesions occurring during life, and causing or influencing death. And, without at all venturing to assert that a backward intus-susception is impossible, I feel bound to record the general impressions derived from unusually large experience as a teacher of anatomy, on the one hand, and special research into this very point on the other, by saying that any one will supply an important pathological detail who will dissect out *in situ*, and adduce, with proper confirmative evidence from a professed anatomist, a single case of backward intus-susception, as usually understood. At present, the occurrence of any such lesion is certainly not affirmed by evidences more numerous or more trustworthy than those which, to the complete satisfaction of many highly educated and intelligent witnesses, affirm the existence of sea-serpents, or assert the perpetual subjection of the disembodied spirits of saints and sages, to the curiosity and greed respectively, of some of the most foolish and unscrupulous of mankind.

The second class of exceptions, or that in which the intus-susception is double, so as to offer four contiguous folds of mucous membrane, rests on evidence quite incontestable. It includes some cases apparently referable to the first, in so far as that, to superficial observation, they suggest a backward peristalsis and intus-susception, where in reality the process is one of the ordinary kind. Both in this respect, and in the mode of their production, they deserve the brief notice they will receive in a subsequent page.

The accuracy of these views is confirmed by various circumstances observable in the comparison of any considerable number of cases. Their relation to diarrhœa, as already alluded to, seems not only connected with that abnormal energy and irregularity which may be fairly attributed to the intestinal peristalsis during this state, but especially with that want of co-ordination between the muscular wall of the lower end of the ileum, and the adjacent large intestine, which even the normal action of the two segments may be said in some degree to suggest. The share of the relaxed anterior or lower segment in producing the intus-susception is well illustrated by a case lately under my care, in which the cæcum and ascending colon seemed to have been paralysed as an indirect result of the deposit of minute granules of cancer in the coats of this bowel, and the ileum thus gradually\* forced by its own contraction high up into the ascending colon. The same element of the process is traceable in the post-mortem invaginations seen as results of the *rigor mortis* in the dead bowel; in which process, as there is no evidence of any

\* The history of the case suggested that the invagination was only carried to the extent in which it was found after death by many days of such continual straining.

very energetic peristalsis, the contraction of the transverse muscular coat may be supposed to effect the short intus-susception by little more than the elongation which any such contraction of any considerable segment of the bowel would inevitably bring about.

The different parts of the intestinal canal are affected with the following proportionate frequency:—In 56 per cent., the ileum and cæcum are carried into the succeeding large intestine (Fig. 11); the cæcum and colon becoming inverted to a variable distance from the ileo-cæcal valve onwards, to form a middle layer, the interval between which and the ileum contains a variable length of the vermiform appendix. Here the ileo-cæcal valve generally forms the lower end (*i c*) of the intus-susception. In 32 per cent., the small intestine forms all the layers (Fig. 8); and, of these 32, in 25 the ileum is specified (though, I think, sometimes inexactly) as the seat of the lesion; the jejunum only three times. In 12 per cent., the colon (including the end of its sigmoid flexure) is the bowel exclusively involved. The rectum scarcely ever forms more than the outer layer of an intus-susception which has descended into it from above. Even allowing for the different lengths of these various segments of the intestinal canal, we cannot avoid recognising, in these numbers, a real difference of liability.

Age and sex, too, are worth noticing. Half the large class of ileo-cæcal intus-susceptions are infants under seven years of age; many but a few months old. Hence the average ages of the ileo-cæcal, iliac or jejunal, and colic cases respectively, are 18·57, 34·6, and 31·4 years. In respect to sex, the male seems much more liable than the female; the male cases being to the female, in these situations respectively, as  $2\frac{1}{2}$ ,  $4\frac{2}{3}$ ,  $1\frac{5}{8}$  (on an average  $2\frac{1}{3}$ )



to 1. This difference seems at least as great before, as after, puberty.

In 5 per cent., the intus-susception is caused by a polypoid tumour, the stalk of which, dragging down the bowel on which it is seated, inverts its coats. In many of the infantile cases, the occurrence of the lesion immediately followed a casual or artificial diarrhœa—a coincidence which also obtained in some of the adults. A proneness to intestinal derangement, especially to constipation or diarrhœa, is also a frequent feature of the previous history. Several cases have also been preceded by attacks more or less resembling intus-susception. Whether, in the ileo-cæcal and colic cases of this kind, any congenital laxity of the meso-cæcum and meso-colon aids or causes this disposition, must remain unknown; all direct proof of such a cause being necessarily removed by the lesion itself.

Every intus-susception presents three layers (*a, b, c*, Figs. 6, 7, 8); conveniently distinguished as its inner, middle, and outer layers; and apposing to each other, in passing outwards from the axial or innermost one, two serous (*e*, Figs. 6, 7), and next two mucous (*d*, Figs. 6, 7), membranes. In other respects, however, the varieties above noticed present some important differences.

In the small intestine, the arrangement of the mesentery dictates from the very first a peculiarity of shape, which all the succeeding phenomena tend to increase. The inverted middle layer receives, not merely the inner (as in the intus-susception of a flexible tube like the finger of a glove), but a kind of conical wedge of the mesentery (*m*, Fig. 7) common to both. The compression thus exercised on the large and numerous mesenteric vessels soon brings about a complete stagnation of their contents; evinced by ecchymosis, or even by copious hæmorrhage, in



the adjacent uninjured mesentery; as well as by enormous congestion and swelling of all the layers of the invagination, and hæmorrhage from the mucous membrane forming its innermost surface. And as the mesenteric edge of the invaginated bowel is thus bound down by what inflammation and exudation soon thicken into a solid mass of mingled original and adventitious tissue, separating the

FIG. 6.

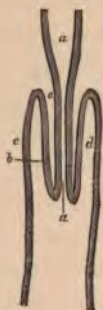


FIG. 7.



FIG. 6.—Diagram to illustrate the intus-susception of a flexible tube, as seen when cut lengthwise.

*a*, inner layer. *b*, middle layer. *c*, outer layer. *d*, interval of two inner (mucous) surfaces. *e*, interval of two outer (serous) surfaces.

FIG. 7.—Similar diagram to illustrate the intus-susception of small intestine.

*a* to *c*, as in preceding figure; *e* being occupied by a mass of lymph. *f*, general curve of the intestine. *g*, special curve of the intus-susception. *m, m*, mesentery.

inner and middle layers of the intus-susception, while the opposite edge is free to obey the impulse of contraction from above, the divergence of the axis of the invaginated part from that of the bowel above and below becomes continually more marked as the inversion proceeds; until it finally forms a segment of a much smaller circle, and points by the terminal orifice of this segment to the

mesenteric edge of the outer layer; with which the lowest part of the inversion (or that joining its inner and middle layers) is often in contact. The more distensible external or convex part of the middle layer is, for the same reason, thrown into transverse folds, somewhat resembling *valvulæ conniventes* (*d*, Fig. 7, Fig. 8).

Any progress of the inversion seems to be generally a mere propulsion forwards, such as adds equally to the length of both its middle and inner layers. But the con-

FIG. 8.



Intus-susception of the small intestine.

The layers of the intus-susception (*a*, *b*, *c*, as in the two preceding figures,) are cut open to show their relation; and the inner (*a*) is occupied by a bent probe, the round head of which protrudes from the terminal orifice of this layer, in contact with the inner border of the bowel.

vertibility of length and width, in an extensible elastic tube like the bowel, renders the swollen and distended middle layer really much the larger of the two; while, conversely, the continually increasing compression exercised on the inner one allows it a considerable increase of length, with little or no increase of surface, as is well seen

in the case of the vermiform appendix. It is, perhaps, by some effect of this kind that we may explain a case observed by Cruveilhier, in which two polyps appeared to have receded at least half way up the middle layer towards its junction with the outer one.

It may be doubted whether any complete obstruction of the innermost tube is generally producible by the mere act of intus-susception itself. But the swelling soon brought about by vascular congestion amply suffices to induce it; still more when this swelling is increased by the exsudation which speedily follows the stagnation of the intestinal blood. From henceforth obstruction is generally complete, and is accompanied by all the symptoms alluded to in the preceding Lecture.

But while, in intus-susception generally, complete obstruction is so far casual and incidental to the process, as that it is sometimes absent, and often appears to permit the continual expulsion of bloody mucus from the central tube of the inversion; so it must further be noticed, that it is generally accompanied, and modified, by a special set of inflammatory changes, which are capable of removing the lesion, and restoring a transit through the bowel it obstructs, at the expense of the loss of the intus-suscepted part.

The congestion, inflammation, and exsudation to which the mesenteric injuries soon give rise, are by no means exactly limited to that segment of intestine supplied by the injured vessels, but extend to a variable distance above and below the junction of the middle and outer layers—especially above, where the obstruction of the bowel, and its resulting dilatation, often render this inflammation additionally diffuse and dangerous. And hence, in most cases, not only are the apposed serous surfaces of



the inner and middle layers glued together by adhesive lymph, but a variable amount of a similar deposit surrounds the ring which forms the upper boundary of the inversion. And it is here that, by and by, the vessels of the healthier bowel above and below are concerned in the formation of two circular lines of demarcation; which, by ulceration, or sloughing, or both, ultimately separate the whole of the invaginated part: so that it becomes free in the cavity of the bowel, while the annular mass of adhesive lymph surrounding this ulceration completes the intestinal channel, and prevents all effusion of its contents.

The exact frequency of this favorable termination of the process cannot be estimated; but it is doubtless much greater than is generally supposed:—not less, I may conjecture, than one in every two (or at most three) cases. On an average, it is not complete before the eighth day, and the liberated bowel is rarely expelled per anum before the tenth day (or two days more). And as the intus-susception, where primarily fatal, mostly kills in about five days and a half, we may fairly conjecture that this casting loose of the invagination is sometimes only prevented by the death of the patient.

Some of the details of the process deserve notice, if only from the risks they bring with them. Inflammation, and all its modifications, take even more than their wonted share in this variety of obstruction. Ulceration, gangrene, and rupture of the distended segment immediately above the invagination are thus brought about. Peritonitis runs rapidly to diffuse suppuration; or, more slowly, forms an abscess (as on the psoas or iliacus muscle), ultimately fatal. Adhesion of the external lymph conditions some future strangulation; contraction of the

cicatrix ends in stricture and obstruction; accumulation of hard indigestible food, or violent exertion, bursts the soft adventitious tube replacing the expelled bowel, and lights up fatal general peritonitis. Or lastly, the patient sinks gradually into a state of exhaustion, too complex to analyse, but probably sometimes referable in part to the loss of secreting and absorbing intestinal surface.

Exactness of coaptation is, of course, an important element in the chance (as well as in the completeness) of

FIG. 9.



FIG. 10.



FIG. 9.—Intestine, after the separation of an intus-susception, cut lengthwise, to show the union of its segments.

*a*, upper segment. *b*, lower segment. *c*, mass of pasty lymph replacing the separated segment, so as to enclose a channel continuous with that of these two segments.

FIG. 10.—Similar, but less exact, union, uniting the two segments by a mass of lymph, with a narrow channel through it.

*a*, *b*, *c*, as in Fig. 9. The upper and lower segments, close to each other on the mesenteric side of the bowel, are some inches apart on the other; the adventitious mass filling this interval being permeated by a long and narrow tube, external to the axis of the bowel.

recovery; and is preventible by various casualties, mechanical and pathological:—by retraction of the contiguous ends of the bowel; by undue exsudation, sloughing, or ulceration; limiting the new channel to a scanty leakage, or to a thready calibre (Fig. 10); or giving it, with a wider aperture of communication between the two adjoining segments of intestine, a wall formed of lymphy or

purulent exsudation, or even of some part of the parietes or contents of the belly, confounded in a similar deposit.

The process of removal is subject to similar, but less dangerous, variations, respecting which the seventy or eighty recorded cases of the expulsion of an intus-suscepted bowel during life scarcely permit any general conclusions. Sometimes the whole intus-susception is discharged as a single tube, in which the middle and inner layers retain their inverted relation to each other. Oftener, I think, the outer of these two comes away first, to be followed by the inner; either in smaller pieces, or as a dark, putrid, pulpy mass, which sometimes comes away so gradually as to suggest a process comparable to solution. In rare instances, the inner layer appears to contract into the cicatrix, in which it is doubtless slowly absorbed from that exsudation of organised lymph which has been mingled with it. The complete obliteration of its calibre by adhesion of its mucous aspect seems more common; though, like the similar adhesion between the mucous membranes of the middle and outer layers near their continuous edge, it is far less frequent than the fusion of the apposed peritoneal surfaces of the middle and inner layers. Lastly, an imperfect fringe of the middle layer, of the inner one, or of both, is sometimes left by the removal of their lower segments.

It seems by no means improbable that the arrangement of these segments is sometimes modified by the mechanical circumstances which attend their expulsion; that one of the layers is sometimes inverted by the distension and peristalsis which attend their loosening and separation, so as to throw them both into a single continuous tube. Certainly the intestine expelled often makes its appearance as a long quadrangular piece, or as a tube here and there



slit up in a line corresponding to its removed mesentery. In other cases it is twisted into a mass, or even knotted at one end. Such contingencies, too, are so far of practical interest, as that they explain the secondary and tertiary obstructions to which the severed segment sometimes gives rise, near the original obstacle, and in its course towards the anus, respectively.

The ileo-cæcal intus-susceptions already described as generally having the valve at their lowest point, are at once recognised by the relations of the vermiform appendix. And what between the outline of the cæcum when inverted, and the subsequent infiltration of the loose tissues outside it, the slender appendix usually acquires such a

FIG. 11.



Ileo-cæcal intus-susception, as seen when cut lengthwise.

*i*, end of ileum passing downwards to *ic*, the ileo-cæcal valve. *ve*, vermiform appendix passing down to its funnel-shaped orifice. *ca*, everted cæcum forming the middle layer of the intus-susception. *co*, colon forming its outer layer.

large funnel-shaped opening (*ve*, Fig. 11) between two projecting lips or folds of swollen mucous membrane, as is

quite characteristic at the first glance. The relation of the remainder of the appendix varies with the length of the intus-susception, and with the casual arrangement of its own mesentery: sometimes (Fig. 11) it is compressed into a long and attenuated tube, passing upwards in a right line between the middle and inner layers; sometimes it is bent into a curve, or fairly doubled up in the bottom of the pouch of the inverted cæcum. The shape of the whole intus-susception requires no special description, save to point out that the roomy cæcum and colon forming the middle layer permit the ileum to occupy it without producing that definitely curved angle seen in the invaginated small intestine. The valve is generally on one side of the extremity; and the intus-susception, if short, is often curved. But the ileum within is rather twisted, than

FIG. 12.



Intus-susception of ileum through ileo-cæcal valve. (Very rare.)

*ii*, ileum, intus-suscepted through the ileo-cæcal valve to occupy *cæ*, the cæcum, and *co*, colon. *væ*, vermiform appendix. *b*, terminal orifice of the twisted ileum.

simply bent, upon its short mesentery; a condition still more marked in those rare cases (Figs. 12, 13) in which the ileum passes through the valve itself.

In the colic invaginations, the three layers often have almost parallel surfaces, and a terminal orifice.

In all these intus-susceptions, the length of invaginated bowel can only be estimated after its retraction, by which the perhaps heretofore short, thick, cylindrical mass is shown to be far longer than might be supposed. Thus estimated, their length varies greatly; the longest inva-

FIG. 13.



Compound intus-susception of ileum and cæcum; the former passing, through the ileo-cæcal valve, and continuously with the latter, into the colon. (Very rare.)\*

*i*, ileum, and *ve*, vermiform appendix, within the everted, *cæ*, cæcum, which is separated by a deep constriction concealing the orifices of the above tubes from the twisted and everted ileum, *i*, below it. *co*, colon.

ginations of the small intestine amounting to three or four feet, or even more; while the ileo-cæcal, or colic, are often long enough to permit a protrusion of the ileo-cæcal valve, or of the colon, to a considerable distance beyond the anus, so as to hasten the sloughing of the intus-suscepted part by this unnatural exposure. Reducing such protrusions to their proper width, they obviously correspond to invaginations in which both the inner and middle layers sometimes involve three or four feet of bowel. No exact aver-

\* Preparations illustrating this and the second lesion are contained in the museums of the Middlesex and Guy's hospitals respectively.



ages can be specified for either variety; but the invaginations of the small intestine seem to be, on the whole, much the shorter (about four or five inches in each layer); the ileo-cæcal much the longer (perhaps carrying the valve into the transverse colon); and the colic of a length about midway between the two. These maximum and average lengths generally correspond with the time occupied by the process; which (as its pathology and symptoms concur to show) is, both in the longer varieties and examples, usually the result of repeated or protracted efforts, lasting many days.

The situation of intus-susceptions in the belly may easily be gathered from anatomical considerations. Short invaginations of the small intestine may occupy almost any region of the abdomen. But they are so much more frequent in the lower end of the bowel, that they oftener correspond with the hypogastric and right iliac regions; regions into which any great increase of their length is pretty sure to bring them, whatever may have been their original seat. The ileo-cæcal intus-susceptions, for equally obvious reasons, begin in the right iliac region, and from hence gradually pass across the belly to the left iliac region; into which, after dragging down the arch of the colon, so as to constitute a short, thick mass parallel with the pubis, they subside, by engaging the sigmoid flexure and the rectum, and thus entering the pelvic cavity. The colic invaginations so far illustrate the same rule, as that, if of great length, they depress and shorten the horse-shoe curve of the colon into the chord of that particular arc of the bowel which was originally engaged by the intus-susception.

In respect to the mechanism of intus-susception, the chief phenomena admit of comparatively simple explana-

tion. The immediate cause of the displacement must be sought, not only in an abnormal violence, extent, and abruptness of that contraction of the transverse muscular layer, which is one element of peristaltic movement, but in a deficiency of that co-ordinate contraction of the longi-

FIG. 14.

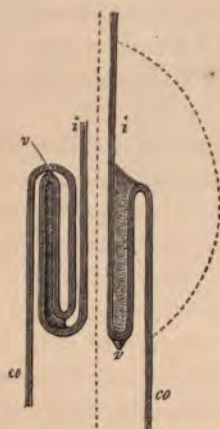


FIG. 15.



FIG. 14.—Diagram to illustrate the formation of a (rare) double ileo-colic intus-susception. The dotted straight line represents the centre or axis of the tube; on its left is the intus-susception as observed; on its right, the state which probably preceded it. *v*, ileo-caecal valve; *i*, ileum; *co*, colon. (The ileum and caecum of the ordinary (Fig. 11) ileo-caecal intus-susception being united by adhesion, a further invagination of the ileum above, unable to sever this attachment or displace the united layers, inverts the colon beyond them, rotating it through the dotted curve, so as to appose the parts forming the ends of this curve, and thus to convert the ordinary single, into an extraordinary double, intus-susception.)

FIG. 15.—Similar diagram to illustrate the formation of a double iliac intus-susception. *v*, *i*, *co*, as in Fig. 14. (The adhesion and fixation of the intus-susception on the right, causes the subsequent inversion to tell on the more flexible ileum above, causing a second invagination within the first, as seen on the left side of the diagram.)

tudinal fibres, which is an equally important (though less energetic) constituent of healthy peristalsis. The sudden

and forcible constriction of a considerable length of bowel—fixed, as it were, behind, by the hitherto unrelaxed contraction from which it has extended, and bounded in front by a relaxed and flaccid bowel (unstretched by the due contraction of its longitudinal fibres)—must, as it suddenly diminishes the width of the segment it involves, simultaneously increase its length, and thus push a variable portion of it into the succeeding dilated segment. This explanation, which seems to be a simple and incontrovertible application of the laws of intestinal movement to the facts of intus-susception, refers the lesion to two causes—an active and a passive; one which thrusts the bowel forwards into the next segment, and one which permits this segment to receive it. And the predominance of one or other of these two causes seems to account for the differences of liability to this displacement exhibited by the various segments of the intestinal canal, just as their concurrence may (unlikely as it seems at first sight) be found in the intus-susception produced by a polypoid growth. For example, the liability to this displacement seems to increase with the proximity of the small intestine to the ileo-cæcal valve. And this increase seems referable (like the effect of diarrhœa) to some such general peculiarity in the muscular action of the end of the ileum, as must equally affect both the above conditions of invagination. But the remarkable frequency of the ileo-cæcal invagination seems to depend on three circumstances: an irregular activity of the ileum, a resistance by the valve itself, and a laxity (probably congenital) of the cæcum. The first tends to invaginate the end of the ileum; the second prevents this bowel from being forced through the valve; the third permits the pliable cæcum to form the middle and outer sheaths. In any case, as I cannot discover the slightest



reason for supposing that this, the commonest, form of the displacement is often developed from an iliac invagination, so I think there are grounds for regarding it as in some degree a lesion especially of the cæcum.

*Time.*  
The average duration of the cases directly fatal appears to be the same in the different varieties (five days and a half). Not so, however, either the frequency or the date of that process of separation and expulsion which removes the intus-suscepted part. Comparing the numbers of such cases of expulsion with those of intus-susception generally, in the same segments of the canal, we may infer that this process occurs more than twice ( $2\frac{1}{3}$  times) as often in the invagination of the small intestine as in the ileo-cæcal variety. And the importance of this disparity is increased by its results: the expulsion of the small intestine generally ending in the patient's recovery, at least for a time; while in one third of the ileo-cæcal cases of expulsion death seems no way retarded. The date of the process affords an equal contrast in the ileo-cæcal intus-susception; the separation and expulsion of the invaginated segments taking place, in the average, on the fifteenth and twenty-second days, instead of the eighth and tenth respectively, as in the intus-suscepted small intestine. In all these points the colic variety closely resembles the ileo-cæcal; but the numbers at my disposal are too small to justify me in according it any separate notice.

The symptoms of intus-susception may be regarded as combining, with circumstances more or less indicative of the process just described, a variable degree of obstruction on the one hand, and of inflammation on the other. The patient is seized with a sudden violent pain, often exactly localized in the region corresponding to the intus-susception; and, even when most agonizing, sometimes distinctly

recognised as a straining or tearing sensation. It is rarely accompanied by rigors. It usually ushers in vomiting. The vomiting may subside, especially if inflammation be early and intense. But it more frequently remains; to merge, in the course of three or four days, into fæcal vomiting. Sometimes it ejects streaks of blood: occasionally it brings up this fluid in considerable quantity. The obstruction indicated by such fæcal vomiting may, however, be not only present or absent—in the latter case being attended by all those symptoms described in the preceding Lecture—but may be in some degree masked by the signs proper to intus-susception itself. Amongst the latter, it is especially obscured by diarrhœa and tenesmus; which, sometimes expelling intestinal contents that have really traversed the invagination, oftener cause a flux of blood and mucus, deriving its fæcal characters exclusively from an admixture with the casual contents of the intestinal canal below the intus-susception.

The tumour caused by the intus-susception is a physical sign of the greatest value. It is probably not often absent, though easily overlooked. Certainly, its small size in many cases, and especially in the earlier stages of the lesion, need rarely prevent its recognition. And even that distension of the intestine which conditionates fæcal vomiting interposes no serious obstacle to the discovery of the solid cylindrical mass which usually reveals an intus-susception to careful examination. It is chiefly by peritonitis, and especially by that extreme relaxation and tympanites of the belly which accompany it, that the tumour of intus-susception is obscured. Sometimes it has been traced passing gradually across the belly, from the right to the left iliac fossa, in the course of a few days. Still more frequently has its disap-

Physical signs.



pearance coincided with the casting loose of the invaginated bowel.

The symptom of the same kind which may sometimes be detected by an examination of the rectum needs no comment. Nor do the enteritis or peritonitis of this lesion require any special description, apart from what has already been said respecting their general intensity, and the collateral perils with which they threaten every stage of invagination, even up to the period of complete recovery.

The general distinctions between the two chief varieties of intus-susception appear to be tolerably well marked. The ileo-cæcal (and, *à fortiori*, the colic) invagination is distinguished from that of the small intestine by—(1) The prominence of tenesmus, which, indeed, in any marked degree, is rarely present where the small intestine only is implicated. (2) The greater size and fixation, as well as the different site, of the tumour, which, if large, generally proceeds to occupy the left side of the hypogastric or the left iliac region. (3) The subordinate share taken by hæmorrhage, which, instead of copious bleeding by stool and vomit, is often little more than a scanty admixture, scarcely sufficient to tinge the mucus passed from the bowels, with violent and frequent straining, by the patient. (4) The still more subordinate share generally taken by obstruction, which not only seems to be often anticipated by death, as regards any complete symptoms of its presence, but to be really absent, owing to the patulous state of the axis of the invagination. (5) The presence of the end of the invagination in the rectum; a differential circumstance which, like the difference of duration already specified, belongs to the more marked and protracted cases, rather than to those usually met with.

The obstacles to such a differential diagnosis seem to



lie less in the real exceptions which rarely obtain, than in that obviously close approach in most of the above characters which the nature and situation of some of these intus-susceptions can impart. For example, tenesmus appears to belong chiefly to the large intestine; copious hæmorrhage, to interference with the vascular mesentery of the small intestine. But the intus-susception of the lower end of the ileum may excite the former symptom, perhaps, by mere proximity; while the casual circumstances of the lesion may bring about the latter when the large intestine only is involved.

In considering the above symptoms, it will be evident that they afford, in the main, very sufficient means for the distinction of intus-susception from all other varieties of the obstructed state. Not only is there the suddenness of its invasion, the acuteness of its pain, the rapidity of its prostrating effect, and—far above and beyond all these in practical value—the detection, by careful examination of the belly, of the intus-susception itself, but the whole process of the malady is different. The physiognomy, so to speak, of the lesion is quite unlike that of mere obstruction. Even as regards the share taken by obstruction itself, it must be remembered that, as above hinted, there are various degrees, and even interruptions, in the impediment it offers to a transit of intestinal contents; so that (as happened in a case of mine recorded elsewhere\*) I have known an intus-susception lasting many weeks, with such scanty pain and obstruction during the latter three weeks of its course, that it really remained questionable how far it had directly aided to bring about death. And if we reflect on the lesion as well as on its effects, we shall, I think, comprehend this pecu-

\* In a clinical lecture reported in the 'Lancet,' 1863, vol. i, p. 409.

liarity. Intus-susception, thus studied, seems definable as an enteritis, quite as much as an obstruction; an obstruction, that is, in which the enteritic element originally produced by a mechanical interference with the intestinal blood-vessels, is of necessity unusually early and prominent. Furthermore, in contrast to all other forms of enteritis, it implies violent peristalsis; while, in still greater contrast to all other forms of obstruction, it specially and directly involves the mucus membrane of the bowel. The movements and throes of intestinal obstruction, added to the pain and intense constitutional reaction of enteritis, form, in the earlier stages of intus-susception, a concurrence of symptoms so characteristic of this state, as often hardly to require the detection of the swelling produced by the invaginated bowel.

In passing on to consider the remaining varieties of intestinal obstruction, it may be premised that while, in the preceding lesion, the share taken by obstruction is, in the main, subordinate to that of inflammation, obstruction now becomes so far paramount, as that the features of the malady seem chiefly dictated more by the locality, than by the nature, of the obstacle. And the practical importance of the first of these two modifying causes is enhanced by the fact that there is a close clinical connection between them both. The several varieties of obstruction under discussion, though they have no essential relation to either of the two divisions of the intestine, do really affect them with so very disproportionate a frequency, that, as we shall see, strictures and twistings obstruct chiefly the large intestine; bands and peritoneal lesions, the small intestine. Nor is the value of this clinical connection, as

a rule in practice, at all incompatible with the scientific value attaching to its exceptions; which, for example, not only teach us, on the one hand, how the symptoms of obstruction are modified by strictures of the canal, or by bands of adhesion, whatever the segment of intestine they may chance to strangle; but, conversely, enable us to judge how far the mere situation of the obstacle, independently of its nature, influences the whole course of the malady.

An analysis of this kind shows that obstruction of the small intestine is characterised by the following peculiarities:—

Pain is more early and severe; and, until distension brings the affected bowel against the abdominal wall, is less distinct in its reference. The first of these circumstances is probably to be referred to the more abnormal character of distension in this part of the canal; the scanty contents and rapid transit of which are contrasted with the more voluminous and solid contents of the large intestine, and with their slower progress through its cavity. The second is, I believe, due to a cognate cause; the structure and office of the larger intestine endowing it both with a greater capacity for distension and local accumulation, and with a more distinct appreciation of such a state.

The umbilical seat of the pain caused by lesions of the small intestine is, I suspect, connected with the homologies (or rather with the developmental import) of this segment of the canal.

Vomiting is also more early, severe, and frequent; characters which are ascribable, partly to the same law of distension, much more to the pathology of this act itself; which, as I have endeavoured to show elsewhere,\* occurs

\* 'Diseases of the Stomach,' Second Edition, p. 56.



in lesions of the various parts of the alimentary canal with a facility varying (*cæteris paribus*) with the closeness of their alliance to the stomach, the central organ of this expulsive process. Fæcal vomiting is also a much more prominent symptom. For, as stated in the preceding Lecture, the rapidity of its access is inversely as the length of intestine intervening between the obstruction and the stomach. While the peculiar arrangement of the ileo-cæcal valve postpones this symptom to such a period of an obstruction in the colon, as is even later than the length and width of the additional segment of bowel to be traversed by the reflected contents would suggest. And it must not be forgotten, that in any wide clinical observations on obstruction in these two parts of the intestinal canal, the frequency with which this symptom is present must follow the same rule as its speediness. For whatever defers fæcal vomiting in most cases, will, in many, prevent it altogether; by allowing the later access of the symptom to be anticipated by the death of the patient.\* A similar uncertainty seems to be traceable in that curious intermittence (or even cessation) of this symptom which has been sometimes seen in fatal obstructions of the large intestine.

The quantity of the urine is another symptom on which great stress has been laid as a means of diagnosis. The rule propounded respecting it states, that the nearer an obstruction is to the stomach, the smaller is the amount of urine passed by the patient. And the explanation of this rule refers it to that diminution of intestinal surface for the absorption of fluid ingesta which the obstruction brings about. Even while questioning the accuracy of both the rule and the explanation, I cannot but regard it as an

\* Thus, in obstruction of the small intestine, all other symptoms may be anticipated and prevented by collapse, destroying life in a few hours.

interesting example of valuable clinical observation, stopping short at a half truth, but pointing to a whole one. That it has little direct value, numerous examples might be adduced to prove:—obstructions near the end of the large intestine, with scarcely any urine passed during many days; obstructions high up in the small intestine, with the urine tolerably copious; and, lastly, obstructions in which the urine, at first suppressed, gradually attained a considerable amount as the disease advanced, or, conversely, was only suppressed towards the very close of the case. And as regards the above explanation, I should substitute for it, on grounds strictly pathological, at least three or four contingent causes; among which suppressed or restricted absorption by the bowel would find but a very subordinate place. That it has no share whatever in causing such a diminution of urine would be a hardy assertion. But, contrasting the copious vomiting seen in some of these cases with the moderate ingestion of fluid often accompanying it, and with the enormous quantity of liquid further found distending the bowel after death, it does seem to me, that the effusion of such vast quantities of liquid from the affected tube constitutes by far the most obvious and simple cause for a diminished secretion of urine, especially when viewed by the light derivable from the analogous diminution seen in Bright's disease and Asiatic cholera—in which we may often notice the same mucous surface acting vicariously to the kidney, on the one hand; as well as depriving it, by a similar process of effusion and expulsion, of the mere watery materials which conditionate its function, on the other.

Hence, without denying that the obstructed intestine may be seriously damaged as regards its absorptive function, I content myself with asserting, that all proof of an

extreme degree of such injury fails us. And while I believe that the amount of vomiting is the truest symptomatic correlative of the diminution of urine, I should not be disposed to lay too much stress even on this connection, close as an analysis of cases shows it to be. For though it roughly measures the amount of intestinal effusion, as well as the proximity of the obstruction to the stomach (the organ of its exit), and would account for more of the urinary variations observed than any other explanation, it, too, affords no single or satisfactory rule. On the contrary, it would seem that violence of the general fever, or of the local inflammation; the pain of micturition, when the bladder is involved in peritonitis; and (I would almost add) mere collapse,—can all, by turns, or in combination, greatly diminish the quantity\* of urine passed during intestinal obstruction.

Among signs specially belonging to obstruction of the large intestine may be first noticed a greater degree of flatulence, in the shape of more violent rolling *borborygmi*, attended by extreme tympanitic distension of the segments of bowel they engage; and amounting not merely to greater dilatation, but to more energetic and persistent movement than is shown by an obstructed small intestine. Related to this contrast is the further means of distinction afforded by the size and shape of the distended large intestine. With anything like an equal degree of obstruction and subsequent distension, the greater dimensions of the colon would quite distinguish it from the ileum; at the same time that its few and simple turns often allow us to recognise its course, which deviates but little from the normal situation of the bowel. Still both of these characters are sometimes equivocal. An

\* Some of these would, of course, rather be instances of concentration as regards its essential constituents.



obstructed small intestine soon emulates, by its distension, the diameter of the healthy colon ; an obstructed colon, on the other hand, requires many days of gradual distension before it perceptibly exceeds its ordinary width. And, whichever of the two segments of intestine be obstructed, or whatever the original seat of the occlusion, the bowel above gradually usurps the greater part of the cavity of the belly, thrusting away, to the margins or floor of this cavity, the empty and contracted portions of the tube.

As regards the locality to which pain and distension are chiefly referred, there is a special source of ambiguity, well worthy of being recollected in connection with the differential diagnosis of obstructions of the large and small intestine. In both the groups of obstruction thus formed, the right iliac fossa is a disproportionately frequent site of the pain and distension. This circumstance is in great measure inherent to the obstructions themselves ; many of which, we shall see, resemble the varieties of intus-susception already noticed, in respect of their affecting with disproportionate frequency the lower part of the ileum, and the adjacent cæcum, which occupy the region of the belly. But, besides this liability to obstruction inherent to the contents of the right iliac fossa, there is an incidental mode in which this part of the abdomen often seems to be chiefly affected, and by which (if not understood) mistakes of diagnosis are easily suggested. The structure and arrangements of the cæcum often cause this segment of the bowel to bear the brunt (so to speak) of obstructions in a distant part of the large intestine. The stricture, for example, which causes the obstruction occupies the descending or the sigmoid colon ; and yet the pain and distension produced are located in the right iliac region in so predominant a degree, as to suggest that the cæcum, or even

the ileum immediately adjacent, is the seat of the obstruction. Nor is it only by the perhaps somewhat equivocal distribution of pain and distension during life that such an error is suggested; but the symptoms of the living patient are paralleled by the necropsy; in which appearances of violent inflammation, amounting to gangrene, and hence easily permitting *post-mortem* rupture of the bowel, are often seen in the cæcum; shading off, with greatly diminishing intensity, to comparatively slight appearances of mischief in the immediate neighbourhood of the distant obstruction in the sigmoid flexure. From reasons of this kind, not only is the iliac fossa a situation which, as such, permits little conclusion as to the segment of bowel obstructed, but which, even supposing the diagnosis otherwise pretty conclusive as to the large intestine being the affected part, throws little light in many cases on the part of this bowel engaged. Nevertheless, the date of these local symptoms in some degree checks their significance; since that distension of the right iliac fossa which specially affects the cæcum by virtue of its office\* comes on late, and is often the result of a change of situation (as regards these symptoms) from the left to the right side of the belly.

Seated in the small intestine, intus-susception gives rise to obstruction much more rapidly and constantly. And the obstruction itself is much more marked and severe. In so far, the diagnosis of this variety of the lesion from other forms of obstruction is somewhat less characteristic than

\* I use this phrase with special reference to that delay which the contents of the cæcum appear naturally to experience, and to that sluggishness and distensibility which seem to be in great measure the causes of this delay. The notion of a special secretion here in health, or of a special effusion in obstruction, rests on too insufficient a basis to deserve reliance. But the influence of the ileo-cæcal valve in throwing the stress of obstruction on the part immediately below it is less questionable.



in intus-susception generally. Still, in the majority of instances its discrimination remains by no means difficult. Of cases of obstruction likely to suggest such an error, I have rarely seen any more approximating to the symptoms of intus-susception than one which I attended some years ago to its favourable termination, and in which a mass of half-chewed filberts could be slowly traced through a considerable length of the intestinal canal. In this instance, at the outset, pain and vomiting were severe; the tumour very suggestive; the mere obstruction, though decided, of no greater urgency than would well accord with the earliest stage of an intus-susception. Nevertheless, there was something wanting to the whole aspect of the case considered as an intus-susception. And when the whole history of the patient's *ingesta* had been elicited, I was left in no doubt that it was an impaction of contents from which the intestine was suffering. Under the influence of sedatives, the mass, which had about the size of a pullet's egg, began to move from the inner edge of the right hypochondrium, almost vertically down the belly; and, in about a couple of days, reached the right iliac fossa, where it was gradually lost to palpation a few hours before that first relief of the bowels which announced the patient's recovery.

For the ground of some wider generalizations respecting the obstructions of the small and the large intestine, reference must be made to the various lesions themselves as affecting these two sites. On the whole, it may be safely affirmed that obstruction in the small intestine runs a more rapid course, is marked by symptoms of greater severity, and is attended with greater danger, than when located in the large intestine. It is easy to understand this contrast, though difficult adequately to resolve it into all its ele-



ments. Not only has the large intestine functions which are less complex, less delicate, and less indispensable to life than those of the jejunum and ileum,\* but even its greater size and mechanical distensibility, perhaps also its special powers of absorbing liquids, render its mere obstruction of less moment;—we may almost say, less divergent from its normal condition.

In the promiscuous collection of necropsies I have made, the remaining varieties of obstruction may be arranged in two groups, which refer chiefly to the small and large intestine respectively, and have to each other proportions nearly as 3 to 2. In the larger group, which includes obstructions produced by bands, adhesions, diverticula, gall-stones, and lesions of the mesentery or other peritoneal structures, the small intestine is the seat of the obstacle in nearly 95 (94·53) cases per cent. In the smaller group, formed by strictures or tumours, and twistings of the bowel and mesentery, the large intestine attains a converse (but less prominent) disproportion of nearly 90 (87·36) per cent.

The *bands* and *adhesions*, together amounting to  $42\frac{1}{2}$  per cent. of the larger group, are only distinguished from each other by the length of that new deposit of which, in its various gradations between lymph and fibrous tissue, they are constituted. More than 80 (81·13) per cent., however, possess the elongation entitling them to the former name. The contingencies of uterine activity seem to render them somewhat more common in the female (as

\* Comparative anatomy and experiment agree in this proposition: the former, by showing numbers of the higher animals in whom the large intestine scarcely transcends a rudimentary state; the latter, by indicating that, even in the human subject, a large portion of the segment may be completely deprived of all share in the transit of the products of digestion (as in cases of artificial anus) with little immediate injury to health.

15 to 13); a circumstance perhaps connected with a slight difference in the age at which they conditionate obstruction (35 to 37 : average for both sexes, 36 years).

Their attachment is generally (75 per cent.) to mesentery or omentum (as 4 to 1)—(as in *a, b*, Fig. 17) ; often (18 per cent.) by both extremities (Fig. 16); oftener (34 per cent.) by one end to the free margin (or some other part) of the bowel (as in *a*, Fig. 17). Rarely (1 case in 5) are they fixed to the large intestine ; and it is still more (thrice as)

FIG. 16.



Loop of intestine strangulated by a band fixed at both ends to mesentery.

*i i*, intestine, of which the mesentery, *m m*, gives origin to *c c*, the strangulating band.

*a*, distended intestine above.

*b*, contracted intestine below, the double strangulation corresponding to *c c*.

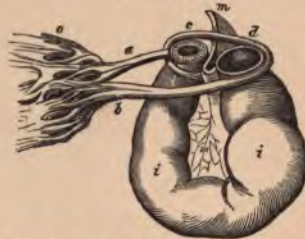
infrequent for them to unite two points of bowel.\* In about 32 per cent. of the female cases, they adhere by one end to some part of the internal organs of generation. The small intestine is the seat of the obstruction they cause in about 93½ per cent. General or local peritonitis, and the diseases to which these inflammations are incident (such as typhoid fever, dysentery, &c.), often figure in the previous history of the patient ; but seem (as the details

\* The epiploic appendages are rarely (1 in 16) their origin.

of the lesion independently suggest) to account for only the minority of cases.

The formation of these bands from soft inflammatory lymph is evidently effected by a process, in which a pasty mass is sometimes elongated gradually by the mere movement of one or both of the two viscera or surfaces it unites; oftener continually drawn out by such a gentle traction on its fixed extremity, while it is as constantly lengthened by new deposit at the other or inflamed

FIG. 17.



Loop of intestine twisted so as to be strangulated by two bands of adhesion tissue. (From a preparation in the Museum of St. Thomas's Hospital.)

*o*, omentum, giving origin to two bands; passing, *a*, to the free margin; *b*, to the mesentery, *m*, of a loop of intestine, *i*.

Of these bands, *a* only completes the noose; *b* strangulates the bowel in two places, *c* and *d*, the first most seriously. The bowel appears to have dropped into the noose from above.

end. Offering no essential distinction from the similar processes witnessed in the serous covering of the stomach,\* liver, heart, and lung, the wider range of the intestines in their containing cavity, as well as the greater complexity and independence of the movements of their various segments, sometimes bring about curious results (as in Fig. 17); which are, however, easily explained by the above statement.

\* Compare 'Diseases of Stomach,' p. 162, *et passim*.



The pelvic cellulitis, to which attention has been called of late years by the admirable observations and teachings of Sir James Y. Simpson, is rarely, in my experience, the cause of obstruction. Its adhesions are generally too diffuse, and their resulting obliteration of the peritoneal cavity too numerous and considerable, to permit of those displacements and irregular actions by which a vagrant coil of intestine becomes entangled in a peritoneal band. Often, indeed, they hinder all descent of the bowel into the pelvis; which cavity is thus (as it were) sealed against such accidents from above, though its own\* contents are liable to be very seriously involved. Even of bands uniting the uterus to the intestine or its mesentery, a majority seem not to originate on the uterine peritoneum, but merely to find a fixed attachment here for that process of gradual elongation already described.

In another sub-variety of this group, the obstruction is formed by the cord-like tube of a *diverticulum ilei*, or by the *vermiform appendix*, and constitutes about 28 per cent. of the group; the abnormal and the normal tube having, however, the relative frequency of 2 to 1.

The anatomy of the *diverticulum*, as a relic of foetal development, has been so well treated of by Meckel and Struthers, that I need not dwell upon it here. Originally a process of the umbilical vesicle, it forms a tube, leaving the ileum a little above the cæcum at an acute angle, and passing for a variable distance towards the navel, which it sometimes joins.† The obstruction it causes seems limited

\* Among such involvements I have seen the ureter completely divided by suppuration from without, so as to pass through a kind of abscess, the walls of which replaced its own channel, where its continuity was thus interrupted.

† Compare Meckel, 'Anat. Path.,' vol. i, p. 555; Struthers, 'Anat.

to the small intestine. And it is, in nearly 80 cases per cent., an adhesion of some part of the tube (usually its free extremity) that completes the strangulating noose; the adhesion attaching it to the following parts in a diminishing order of frequency—the abdominal wall, the mesentery, the small intestine, the navel, the omentum, and the large intestine.

The obstruction caused by the vermiform appendix suggests somewhat analogous rules. Strangulating the large intestine, in spite of its proximity, not oftener than once in 14 such cases; and always adherent (usually at its tip) to form the noose; it is attached oftenest to the mesentery, and next, with a continually diminishing frequency, to the small intestine, the large intestine, the ovary, the omentum, and the abdominal wall generally. Proximity and relative movement are the causal relations here suggested.

The average age affected seems almost to correspond in both these last obstructions; their youth (about 22 years) suggesting (however vaguely for the lesions of the vermiform appendix) some developmental origin. Sex seems only to differ in the case of the diverticula; the obstructions produced by which appear (like intus-susceptions) to be from twice to thrice as frequent in the male as in the female.

Apart from these facts, there is little in the pathology of the four preceding kinds of obstruction calling for notice. The vague and casual suggestions of peritonitis, or of previous obstruction, sometimes afforded by their history, have scarcely any practical bearing on their diagnosis during life. The pain which ushers in their obstructive results is equally uncertain; and not only seems to be, on the whole,

Observ.'; also Author's article, "Intestine," 'Cyclopædia of Anatomy,' Supp., p. 404.

of moderate intensity, but, where severe, is quite as often referable to distension of the bowel, as to the hyperæmia and inflammation which cause the characteristic pain of the bowel when impacted, either by intus-susception in its own coats, or by protrusion through a hole in the mesentery. In this respect they seem akin to ordinary strangulated hernia. The duration of the malady is on an average about six days; an estimate which will apply to the other varieties of this group of obstructions, with scarcely any alteration. The rarity of any spontaneous restoration of transit becomes at once intelligible when we consider the circumstances necessary to effect it: the exactness of coaptation and of gangrene necessary to a fistulous communication between the segments of bowel above and below the obstruction, on the one hand; and the many perils which attend the formation of an abnormal intervening cavity, on the other.

The obstructions caused by the compression of a fold of *peritoneum* constitute about 21 per cent. of this group. Of this 21, ruptures of the mesentery form about 15 or 16, or three fourths; the average age being  $34\frac{2}{3}$  years, and the sex at least two males to one female;—a fact doubtless connected with the violent exertion to which most of them are immediately traceable. The sudden intense pain and the hæmorrhage which often attend the accident, and usher in the symptoms of obstruction, are equally explicable. The other peritoneal causes are too various and infrequent to repay notice: obstructions from protrusion of bowel through a hole in the ragged omentum ( $2\frac{1}{3}$  per cent.), through a persistent urachus, through the suspensory ligament of the liver, through the muscular coats of the bladder, and through the meso-colon, are alike occasional.

Obstructions by *gall-stones* form about  $8\frac{2}{3}$  per cent. of this



group. Their average age is  $57\frac{1}{3}$ ; their sex, four females to one male. So far as I know, the stone almost\* always enters the bowel by direct ulceration, through the coats of the apposed gall-bladder and duodenum, and not down the cystic duct;—a fact sufficiently explained by the large size such a stone must possess, in order to become impacted in the intestine at all. It is often the only gall-stone present; indeed, is often a complete cast (oval or pear-shaped) of the gall-bladder itself; or is the severed half or third of such a cast. These details are practically important, since they suggest (what, indeed, experience confirms) that, while we may always expect, in the previous history of such cases, some evidence of that hypochondriac inflammation and ulceration by which the stone enters the duodenum, we must *not* expect to find equally constant evidence of those ordinary paroxysms of pain and jaundice which attend the passage of gall-stones down the duct. In some of these cases, indeed, the enormous gall-stone which causes the obstruction seems to be the first, as well as the last, the unfortunate patient is ever troubled with. Once free in the duodenum (which, by the way, has been fatally strictured by the chronic inflammation thus set up, long after the stone has left the body), it passes down the small intestine, in its course towards extrusion from the bowels. Rarely, it becomes sacculated in the intestinal walls, and remains thus for years without affecting the intestinal calibre. In a majority of cases, it is in the jejunum or upper part of the small intestine that these stones become impacted; but about one in every five seems to be stopped by the constriction of the ileo-cæcal valve. How many of

\* The only exception I know of is a case communicated to me by Dr. Rose, of Hampstead. Here the obstruction was caused by a large cystic gall-stone blockading the bowel by external pressure.

them safely traverse the whole canal it is impossible to conjecture; but we are entitled to suppose that those successfully expelled are at least half as numerous as those arrested; which latter, by the way, rarely exceed  $2\frac{1}{2}$  inches in their longest diameter.

Rare as are these impactions of large gall-stones, I venture to hope that the information thus briefly put together will render it henceforth easy to distinguish them from all other obstructions. Taken in conjunction with the duration and intensity of their premonitory symptoms, their great pain, their incessant and severe vomiting, the frequent and intermittent attacks which sometimes seem to indicate their being obstructed here and there in their slow passage down the small intestine, and the rapidity with which the last attack sometimes ends in death, they constitute a form of obstruction which, both from its proximity to the stomach and its other circumstances, exhibits features, to say the least, unusually suggestive of a correct diagnosis of its cause. While, pathologically, they have great interest from the fact, that the diameter of the obstructing gall-stone, as contrasted with that of the intestine above it, indicates either some active muscular contraction at the obstructed part, or some dilatation above such as requires further elucidation. It is probable that the distension produced by the obstruction is often increased by the cadaveric changes of the intestine and its contents. But even allowing for this increased distension in the necropsy, I should be disposed to regard the obstruction as attributable, in part, to active contraction; to which, however, considering its provocation and its object, I should hesitate to apply the term of "spasm."

The *strictures* and *twistings* which form the second

group affect the large intestine in proportions of 92 and 76 per cent. respectively; on an average of both lesions,  $87\frac{1}{3}$  per cent.

The strictures are about 73 per cent. of the whole group. But I have found it impossible to exclude from this class some tumours probably of malignant nature, and of external origin; and can only conjecture that this excess would be compensated by those cases in which twisting is produced by a tumour dropping over the bowel or its mesentery. As regards the sex of these cases of stricture, the males are to the females as 3 to 2; and their average ages, 43 and  $46\frac{1}{3}$  respectively, afford a mean for both sexes of  $44\frac{2}{3}$  years.

The frequency with which stricture causes fatal obstruction in the several parts of the large intestine is as follows: Of 100 such cases, 4 are in the cæcum, 10 in the ascending colon, 11 in the transverse colon, 14 in the descending colon, 30 in the sigmoid flexure, 30 in the rectum. In an estimate of the pathological liability of these different parts, it is well to bear in mind that while the shortness of the cæcum renders its stated number too small, the greater length of the sigmoid flexure renders its number too large; so that, for equal lengths of intestine, there is a much more uniform increase than is suggested by these figures in the liability to this lesion of the bowel as it approaches the anus. The increased proportion in the rectum is, of course, even greater when its shortness is allowed for. Personal observation entitles me to add that this vast rise in the liability to stricture begins in the lower part of the sigmoid flexure. But a more practical view may, perhaps, be summed up by the statement that, to bisect the transverse colon in the median line of the body, would divide the large intestine into two segments, of



which the left one is visited by this form of obstruction four times as frequently as the right.

The symptoms of this lesion afford some details which usefully confirm what has already been said respecting obstruction in the large intestine, at the same time that they have a special relation to what we shall see is a vital point in the treatment of such cases, namely, the exact locality of the stricture.

In a majority of cases there is a history of marked and almost characteristic constipation prior to the attack. Sometimes, indeed, the patient's life has already been placed in jeopardy by similar obstruction. Oftener it will be found on inquiry that the constipation, even if intermittent, has, on the whole, gradually deepened into downright obstruction during the months (rarely years) which have preceded the last attack. Hæmorrhage, as a premonitory symptom, belongs chiefly to cases in which the stricture is either caused by a cancerous excrescence, or has merged into one in the course of its development.

Diarrhœa points to the same modification of the simple stricture, less frequently to a non-malignant ulceration of its intestinal surface. Associated, too, with frequent and excessive pain, I have known intermittent diarrhœa to indicate the rare contingency of obstruction from ulceration: that is, from a solution of continuity\* due to this latter

\* A remarkable case of this kind came under my notice seven years ago. The ulceration extended quite round the bowel, which, above this part, was enormously dilated and hypertrophied. This condition, which, from the history and physical signs, was easily diagnosed at the first interview, was apparently produced either by mercury, or by syphilis, or by both. It was greatly relieved by opium and iodide of potassium. One or two attacks of obstruction, which had become alarmingly dangerous under the ordinary calomel and purgative treatment, yielded with great ease to the sedative

process, and engaging a sufficient arc of the circle of bowel to impede transit by arresting peristalsis. The closeness with which the results of loss of substance imitate those of the deposit of a new tissue, or the resemblance of the obstruction produced by annular ulceration to that caused by stricture, receives its explanation in the proportion laid down at the beginning of this Essay (p. 3). And it finds an instructive parallel and illustration in the more frequent examples of ulcerative obstruction witnessed in the stomach. In other respects obstructive ulceration of the bowel is too remote from our subject to justify further consideration; the less so, that it is not only rare, but for the most part easily distinguished from stricture by the ordinary symptoms of ulceration.

The duration of the obstruction caused by stricture of the large intestine is remarkable.

As regards mere numerical estimates, the numerous cases which I have collected include several instances in which there seems good reason to suppose that the operation undertaken for the relief of the distended bowel had been deferred to a period when it must necessarily have rather hastened, than retarded, the ensuing death. In spite of this, however, they show an average of twenty-three days of complete obstruction prior to the fatal event.

My own experience greatly extends this average. If I looked, indeed, mainly to what I have seen, and still more if I confined myself to cases where that sedative plan of treatment which is most desirable had been steadily pursued from an early stage of the obstruction, I could hardly estimate the whole duration of this condition in fatal

plan detailed in the following Lecture. Ultimately, a rapid and unexpected relapse and extension of the ulcerative process caused death by perforation.

cases at less than six or eight weeks. The longest duration in my experience is just three months. Even here, however, the limit was rather nominal than real; the final obstruction, to which alone this statement refers, being the termination of one or two relapses, in the last of which there was at any rate but a single scanty and doubtful transit of intestinal contents. Indeed, I am persuaded that the true limit of maximum duration transcends anything I have yet seen. With all the resources of Medicine\* directed to the sustenance of life, and in a constitution of exceptional tenacity, I am persuaded that a duration of at least four months would be attainable. Certainly it is difficult to avoid concluding that the treatment until lately regarded as orthodox has habitually doubled or trebled the rapidity of the malady, and has increased its sufferings in a degree vastly disproportionate. While it may be broadly laid down, that apart from the recoveries brought about by a safe (and therefore early) operation for artificial anus, the duration of this variety of obstruction in the fatal cases is a fair expression of the success of treatment; both in respect of its measuring the relief afforded to these instances, and in its permitting, in less incurable examples, the most frequent recoveries. To this topic we shall hereafter return in dwelling on the treatment of obstruction.

That aid to diagnosis which is afforded by the outline of the distended large intestine being seen and felt through the wall of the belly, is often confirmed or checked by the careful examination of the lower end of the tube *per anum*. The colon, let us suppose, may be seen gradually increasing in size, and in dulness to percussion, as it passes

\* It will be seen I am not speaking of the "natural history of disease," but of the most thoughtful and painstaking treatment of it.



through its ascending, transverse, and descending portions, until, at the lower end of the straightened (or almost effaced) sigmoid curve, it sinks vertically down into the pelvis, of which it occupies nearly the whole cavity. In such a case the obstruction must be quite accessible to a digital examination from the anus. Stricture in this situation interferes so much with ordinary defæcation, and is generally attended with symptoms otherwise so marked and persistent, that the condition above described is most commonly the result of impaction of scybala in the lower end of the rectum. Repeatedly a brief inspection and palpation of the abdomen has thus assured me, beforehand, of what the introduction of the finger has verified immediately afterwards.

Of course, under similar circumstances, the nature and situation of a stricture is often ascertainable by the same means. And it is hardly necessary to say that, even apart from that careful and thorough examination of the abdomen, which (as it seems to me) should usually precede them, an examination of the rectum, both digital and instrumental, may often be adopted with advantage. But I must candidly state that delicacy of perception is almost impossible where the bougie, and *à fortiori* the flexible tube, is the means of such an inquiry. The diverse form and position of the mucous folds of an empty rectum, and the distortion often inflicted on its cavity by the adjacent viscera, or even by the distension of an obstructed segment of bowel above it, may permit the strangest errors, even to the specialist most accustomed to introduce the bougie. To the objections drawn from the doubtfulness and uncertainty of such information, we must add those deducible from its danger; with respect to which it must suffice to say, that both instruments have repeatedly

been known, in hands not otherwise unskilful, to wound (or even perforate) a distended and inflamed bowel, and thus, at any rate, to secure and hasten death.\*

In my own opinion, there lies only one appeal (so to speak) beyond a thorough digital examination, where this affords no answer to our questions. With reasonable care, injections of liquid may be made to afford pretty exact information as to the site of the obstruction. Of course, the administration of such enemata should at least be overlooked by a competent professional observer, without whose guarantee the statements of an ordinary nurse constitute a very insufficient basis for conclusions of any diagnostic nicety. Of course, also, many circumstances affecting the condition of the bowel below † the obstruction permit segments of analogous length to receive somewhat diverse quantities of liquid. But, on the other hand, as the treatment of such cases not only justifies, but claims, ‡ the repeated and frequent use of the largest enemata which the bowel can be induced to receive, the casual difficulties or embarrassments of one operation are often checked or averaged by those which follow. And it is quite singular how trustworthy I have found the conclusions thus arrived at. For example, with a maximum injection of a pint of warm bland liquid, the obstruction of an ordinary male adult may be referred to a point not lower than the upper end of the rectum. A pint and a half, two pints, three pints, belong to corresponding

\* Compare the remarks on this topic in the subsequent Lecture.

† For obvious reasons, the bowel below the obstruction is very unlikely to be the site of any considerable dilatation; but presents what, compared with these parts of the intestine generally, is almost a minimum of calibre. (See Fig. 3, a.)

‡ See the remarks on the treatment of these cases in the next Lecture.

segments of the sigmoid flexure. The descending and transverse colon accept a larger, but more irregular, quantity.

In a well-marked case of obstruction which I attended two or three years ago, and in which it was evident that the stricture occupied the upper part of the ascending colon, nine pints of injection were always found to be the maximum during the many days which preceded the complete and permanent relief of the occlusion. A larger quantity than this would scarcely be receivable by the whole of the large intestine; inasmuch as, in such a case, the circumstance that the obstruction occupies the small intestine often makes the belly much more sensitive to distension, however gently and patiently the process of filling the bowel may be carried out.

It is difficult to make any strict or accurate comparison between the strictures of the large and of the small intestine. For even the small proportion (1 in  $12\frac{1}{3}$ ) of strictures above estimated to occur in the latter segment, must be much diminished, if by the term stricture we are to imply anything like an analogous pathological lesion. In the majority of cases, the narrowing of the small intestine is the result of the healing of an ulceration or sloughing of the bowel; and, as such, is not so much the seat of a gradual contraction which ultimately obliterates the calibre, as the subject of casual and interrupted closure. In many instances this closure can be traced to the impaction of intestinal contents, the quantity or quality of which renders them peculiarly liable to bring about such a partial or secondary obstruction. And, inasmuch as hard, indigestible solids are occasionally the causes of obstruction of the healthy small intestine, both in children and adults, these cases of stricture may be said to merge



into the casual obstructions in which the impaction of these unsuitable *ingesta*, and the violent intestinal contractions they excite, are the sole causes of the dangerous symptoms present. Like these casual obstructions, they constitute a very hopeful class of cases, recovery being quite possible under appropriate treatment, in all but the most extreme instances. The obstruction caused by a large, hard, single mass, firmly impacted in a conical and almost obliterated segment of jejunum or ileum, is obviously little likely to yield to any treatment. But such an unfortunate conjunction of *lædentia* is exceedingly rare. And just as an ileum of normal calibre may be helped to yield a passage to a hard body of considerable size (a biliary calculus of the dimensions of the gall-bladder, for example), so an impacted mass of salt beef,\* salad, filberts, and even cherry-stones, may be gradually passed through a yielding segment of small intestine which might at first sight seem narrowed enough to offer an impassable barrier.

Another group of obstructions is formed by the cases in which there is a *twisting* or overlapping of the intestine, so as more or less completely to obliterate its calibre. In respect to the causes of such obstruction, there is great diversity. Among the rarer, are tumours attached to the bowel; and displacing it, either by their mere weight, or by the impediment they offer to complete and uniform peristalsis. In more numerous instances, the meso-colon has

\* If the mention of these homely substances seem beneath the dignity of scientific medicine, it will perhaps be excused by the circumstance that each specifically refers to a corresponding case in my experience, in which the obstruction was unequivocally due to such impaction, and in which the previous history and symptoms of the patient left no reasonable doubt of ulceration and constriction from disease occurring long before. In similar cases, the above proposition has been confirmed by a necropsy after death from independent disease.

an undue laxity or length, by which it seems to permit a similar displacement. Still more frequently—far too frequently to be fairly explicable as a mere coincidence—they are associated with hernial displacement of some other part of the canal. In the majority of instances, too, such hernia affects a distant and independent part of the canal (oftenest, of course, the small intestine), from which it is very difficult to suppose that there can be any direct and immediate transfer of abnormal action, muscular or otherwise.

As respects their situation, the sigmoid flexure is the most frequent seat of these lesions, about half of which occupy this part of the colon. The transverse colon is less subject to them than the ascending colon; and this, again, is (relatively to its length) less subject to them than the cæcum. The small intestine furnishes about one fourth of the total number; in other words, is, relatively to its length, considerably less liable to such twisting than the large intestine in this segment. The ileum is by far the most frequent site; but no exact numerical estimate can be offered—a circumstance which is not surprising, considering the artificial boundary between it and the jejunum.

The sex of their subjects is represented by a proportion of 13 males to 10 females. In both sexes, the age is alike great. In this respect, the average age is curiously contrasted with that of all the preceding varieties of obstruction, reaching to 54 years. Comparing the absolute age with the number of persons living who have attained it, we are justified in surmising that the *liability* to this form of obstruction is one which increases greatly to an age at least considerably beyond 54; very possibly up to the latest epoch of life. Their symptoms may be usefully compared with those of obstruction from stricture. On an average, the duration of the process is greatly diminished—

from 23 to  $9\frac{1}{2}$  days. This diminution evidently corresponds with the absence of those long and marked premonitory symptoms which in many cases precede obstruction by stricture, and are, indeed, essentially connected with efforts of Nature to ward off this fatal result. And, on the whole, the obstructions from twisting of the bowel are distinguished from the strictures by the intensity and rapidity of the inflammatory phenomena which attend them. So large and characteristic is this difference, that even the marked characters usually imparted to obstruction by its situation in the large intestine are obscured and subordinated by the circumstances which thus regulate the nature and rapidity of its access. For instance, the obstruction caused by twisting of the colon often destroys life much more quickly than that of the strictured ileum; which latter form of obstruction, again, both in respect of the symptoms which precede it, and the hypertrophy and dilatation of the bowel which accompany these premonitory symptoms, approaches much more closely to the obstruction caused by stricture of the colon.

Traces, however, of symptoms more analogous to those of obstruction from stricture may be seen in certain of these twistings. For some of those caused by undue length or laxity of the sigmoid mesocolon are associated with a longer duration of the whole process, and are shown by the necropsy to be connected with a degree of hypertrophy and dilatation above the obstructed part in exact consonance with these symptomatic characters.

Any inferences as to the pathological import of the whole group must be at least compatible with the above brief statements. The lesion favours the male sex, and advanced life; it affects various parts of the bowel pretty much in the order of the presumable activity of their ordi-



nary peristaltic action, falling with undue frequency on parts which, like the sigmoid flexure, alternate a slow accumulation of their contents, and a proportionally energetic and intermittent propulsion. It is often directly traceable to such mechanical embarrassments as can scarcely act save by interfering with peristalsis. It is still more frequently connected with hernial lesions; which, we know, seriously embarrass the general propulsion of the intestinal contents, and the evidently indirect influence of which on its production becomes only explicable on this view. In its phenomena, as contrasted with those of obstruction generally, we see duration shortened, inflammation paramount, and (as regards the bowel) paralysis early and frequent, peristalsis often subdued from the very first onset.

All this may be said to point chiefly to irregular and defective peristalsis as the cause or origin (*causa causans*) of the lesion. In this respect, as well as in its phenomena, it is allied, however distantly, to intus-susception; the characters of which are in some sense approached by its symptoms. Whether this irregularity or defect of peristalsis has sometimes any more real and close alliance to enteritis, in the sense of being akin to an early stage of the inflammatory process—as a variety of that paralysis which is the earliest and most constant symptom of such inflammation—must remain for the present doubtful. But the remarkable proclivity towards inflammation seen in these cases almost suggests some relation of this kind; and the resulting difficulty of diagnosis adds a limited (though equivocal) confirmation to such a view. In any case, the pathological relation of these twistings to enteritis is both interesting and important.

I hardly dare venture to modify by any personal experience the gloomy prognosis which the history of these

cases in general would abundantly justify. Two or three cases, however, which have seemed to me marked examples of the lesion, have made excellent recoveries, and have seemed, as regards the symptoms of mere obstruction, unusually manageable. In these, the total duration of the obstructive symptoms has ranged from six to ten days, and the amendment has been both much more gradual, and much more interrupted, than is usually seen in the cure or recovery of obstruction.

Here, then, I end this brief survey of the chief varieties of obstruction from a diagnostic point of view—a survey from which I have reluctantly excluded many curious details, as well as all citation of the numerous interesting cases which abound in the records of the obstructed state. I can only hope that the conclusions I have offered, based as they are on a careful analysis of a large proportion of the facts which have hitherto accumulated towards the study of this important group of maladies, will help to justify the proposition which seems to me independently deducible from the narrower (but deeper) information furnished by my own personal experience—namely, that even in the earliest stage of an intestinal obstruction, we may in most instances recognise both its situation, and the group of obstructions to which it belongs.

Some of the chief numerical conclusions used in the preceding Lecture are conveniently summed up by the following table :

# INTESTINAL OBSTRUCTIONS (EXCLUDING HERNIA).

*Frequency*, 1 in 280 deaths (from 12,000 promiscuous necropsies).

*Varieties*, relative frequency per cent. (from 600 necropsies of obstruction).

Intus-susceptions, external (bands, &c.), parietal (strictures, &c.), torsions } = 100.  
32 17 8

*Intus-susception*, varieties of, per cent. { ileo-caecal, iliac, jejunal, colic } = 100.  
43 56 28 4 12

## REMAINING FORMS OF INTESTINAL OBSTRUCTION.

Part of the intestine obstructed.	Lesion.	Ratio of Sexes.		Average Age.	Bowel affected per cent.		Average duration in days.	Percentage of each in group.	Per-centage of the two groups.
		Male.	Female.		Small.	Large.			
Chiefly (95 per cent.) of small intestine ...	Bands, adhesions .....	13	15	36	94	6	6 {	33	60
	Diverticula ilei.....	5	2	22	95 (?)	5 (?)	6 {	9	
	Vermiform appendix ...	1	1	22	91	9	6 {	18	
	Ruptured mesentery ...	2	1	35	100	...	5 {	9	
	Other peritoneal lesions.	...	...	...	...	...	...	16	
	Gall-stones .....	1	4	57	100	...	5 (?)	5	
Chiefly (88 per cent.) of large intestine ...	Strictures .....	3	2	44	8	92	23	68	40
	Torsions .....	13	10	54	24	76	9½	32	



## LECTURE III.

### THE TREATMENT OF INTESTINAL OBSTRUCTION.

Relation of diagnosis to treatment. Surgical or operative treatment.

Import of cases of gastrotomy hitherto recorded. Statistics of gastrotomy: their deficiencies, their inaccuracies. Propriety of the operation; as a (1) general, (2) special question. Illustration. Gastrotomy contra-indicated in obstruction from (1) intussusceptions; (2) strictures (operation to be substituted for it); (3) constipation; (4) gall-stones. Indicated in obstruction by bands, adhesions, diverticula, rent mesentery, twisted bowel, &c. Influenced by age, inflammation, and other casualties. Medical treatment. Its indications: to protract the case; to diminish distension; to sustain peristalsis. Illustrations, in Man, in animals. Indications of treatment. Prevention of distension. Alleviation of pain. Choice of Sedatives. Enemata; their nutrient, derivative, and mechanical uses. Mode of administration. Purgatives; their hurtfulness, in enemata, by mouth. Mechanical appliances: manipulation, tubage, inflation, crude mercury. Counter-irritants, fomentations. Objections to the views suggested. Appraisalment of treatment. Personal experience, its interpretation, its contrasts. Treatment suggested; simple, rational, effectual. Summary of its details, in the forms and stages of obstruction. Conclusion.

IN the two preceding Lectures, we have successively considered: (1) the chain of phenomena common to all intestinal obstructions; and (2) the symptoms characteristic of its chief varieties. In the first we found that any mechanical obstruction of the bowel causes an accumulation of its contents above the obstructed part; that this accumulation provokes such a peristalsis as ensures

their mixture, and, strictly speaking, their reflux; and that increasing distension finally brings about paralysis and inflammation of the intestine, ending in the collapse and death of the patient. In the second we estimated the relative frequency of the several forms of obstruction usually met with, and pointed out that their symptoms (referable chiefly to the nature and situation of the obstacle) generally permit an accurate diagnosis, even in the earliest stages of any given case.

It is on the substantial accuracy of these two conclusions that all I have to say respecting the treatment of intestinal obstruction essentially depends. Not only would it be difficult to mention any group of maladies which better illustrates the unity of the Science and the Art of Medicine; but I would add, as the key to the following remarks, that scientific insight, and accurate and early diagnosis, have a specific if not unusual value in respect to both branches of treatment. If the process of mechanical obstruction cannot be distinguished from that of enteritis, the Physician may search in vain for principles to guide his administration of food or remedies. And if one form of obstruction cannot be distinguished from another, the Surgeon can scarcely venture to operate with any reasonable chance of success.

In respect to the history of the *operative or Surgical* treatment of mechanical obstruction, it must be confessed that the cases hitherto recorded afford little ground for any general deduction. That operations have been performed with the view of removing this state; that they have in rare instances been successful, more frequently unsuccessful; that, in the latter and more numerous class of instances, a careful search among the viscera exposed by gastrotomy has occasionally shown such an obstruction as

no further operation could remove, or has sometimes shown no obstruction at all:—such are almost the only general conclusions which the collation of the numerous examples on record would afford to any one who should question them for information to guide his own conduct.

In point of fact, the progress of our knowledge with respect to this group of diseases reduces many of the examples thus glanced at to a very subordinate import, even in the casuistry of intestinal obstruction; and certainly goes far to deny them any wider usefulness. With no personal motive for depreciating information which I have only obtained by much research, and which is still comparatively unknown to the profession at large, I can find little in many of the recorded successes of gastrotomy, save an assurance of facts requiring no such verification, on the one hand, or a suggestion of contingencies scarcely likely to be paralleled, on the other. In one case, an intussusception has been withdrawn. In another, a band has been divided. In another, a portion of intestine cut out, with a tumour attached to it. But just as, in some of the parallel cases, in which manipulation of the belly, or the administration of crude mercury, or the violent shaking of the patient, has succeeded in removing the obstruction, so there are instances of successful gastrotomy on record, in which our wonder at the happy audacity of the operator is unaccompanied by any the slightest wish or hope to imitate his procedure. That the mere operation may succeed, there is scarcely any need of these cases to inform us. That it is justifiable, is a conclusion which, even supposing them to record failures and successes with rigid impartiality, they would be utterly incapable of establishing.

The necessity—in other words, the moral justification—



of such an operation, must be sought in a contrast of its results with those of the disease when not so treated. But, on the one hand, any large (in other words, any safe) estimate of the fatality of obstruction altogether fails us. For in promiscuous records, we cannot accept any diagnosis uncertified by necropsy. And, for obvious reasons, the details of recoveries are rarely recorded as fully and exactly as those of fatal cases. On the other hand, I am convinced that we have yet to learn the true mortality of mechanical obstruction; that the high mortality it has hitherto offered may be vastly diminished by appropriate medical treatment, and is, indeed, already lessening from year to year. In like manner, we have no safe or trustworthy statements as to the mortality of gastrotomy itself. Further, its very severity and danger have, as it were, reacted upon themselves, so as enormously to increase their own amount. Precisely because it is an operation involving great pain and peril; exposing a vast and delicate serous surface to an unnatural and dangerous contact with the air; and implying, in many cases, a manipulation such as really amounts to a violent mechanical irritation of the intestines, in order to give the surgeon access to the obstructed point:—precisely for these reasons, it has (naturally enough) been often postponed until the access of paralysis, adhesion, or inflammation has robbed it of the greater part of its probabilities of success. So that it is hardly too much to say, that even the secure diagnosis, and the accessible seat, of an ordinary hernia, would permit the operation for its relief to be a somewhat debatable measure, were it customary to defer it to that stage of obstruction at which gastrotomy has hitherto been usually performed.

Thus considered, I think that the general question, “Is

gastrotomy justifiable in intestinal obstruction?" must be answered with a decided negative; a negative with which any sound practitioner (however limited his views or his experience) might well anticipate all that the most extended research, or careful clinical study, could suggest. In a disease which, however frequently fatal, often allows the patient to recover, even at the last gasp, we naturally feel bound to defer an operation which is only less dangerous than the disease itself, to a period when, in a vast majority of instances, it is no longer a mere obstruction which is present. In scarcely any instance of obstruction is death, strictly speaking, certain; and in few instances in which the operation is thus performed, can we regard this slender thread of hope as materially strengthened.

But, assuming the accuracy of the information I have offered, and the principles I have advanced, it is quite otherwise with that practical question which is often submitted to us by a particular case of obstruction. If, for example, we are right in supposing that the varieties of this state (distinguishable, as such, at an early period of the case) have different degrees of fatality; that some permit so frequent a recovery as scarcely to justify this dangerous operation at all; while others are so desperate as to afford only this chance of life—we may not only reject, and practise, the operation in two such varieties respectively, but may find, in the latter proposition, a justification for our practising it at a period of the malady which will render it far less dangerous, and, therefore, far more justifiable.

Few illustrations of the practical accuracy of this way of regarding gastrotomy recommend themselves more directly to our notice, than the operation often named after

Amussat, in which the right or left lumbar colon is opened to relieve the distension produced by an obstruction nearer the anus. It is quite true that the anatomy of the operation—especially the unwounded state of peritoneum it generally permits—constitutes one chief reason for its more successful results. But it can hardly be doubted that its success is partially due to other causes. Indeed, considering the circumstances of many of the obstructions for which it is performed—the serious lesions (cancer or stricture) by which they are caused, and the scarcely less serious incidents (diarrhœa and hæmorrhage) by which they are often long preceded—we are perhaps justified in regarding the absence of interference with the peritoneum as partially counterbalanced by some of the other circumstances of the operation. Yet practically there can be no doubt that this unpromising measure, mostly undertaken merely to palliate the suffering, or to defer the approach, of inevitable death, has been every way more successful than any other operation hitherto practised for the relief of obstruction. And, theoretically, we may gather from the statements of the preceding pages, that this striking result is greatly favoured by the comparative security of the diagnosis of these obstructions; and by the circumstance, that the physiological relations of the large intestine render the phenomena of its obstruction altogether of slower, and later, occurrence than are the same phenomena in obstruction of the small intestine (compare p. 61).

In attempting to delineate the cases which call for gastrotomy, time fails me either to illustrate them by examples, or to recapitulate the characteristic symptoms of the several forms of obstruction. I shall adopt the less diffuse, and more trustworthy, method, of gradually excluding from the operation all unsuitable cases, by point-



ing out what circumstances ought, in my opinion, definitely to forbid its performance.

Firstly, as regards the *intus-susceptions* which we have found to constitute nearly half the fatal cases of obstruction recorded. In this group of obstructions, an operation ought not, I think, to be mooted. For a large proportion—if we may trust the information I have collected, no less than thirty or forty per cent.—of all intus-susceptions, undergo a process which permits, and often really accomplishes, the recovery of the patient by casting off the intus-suscepted part. Besides, in the early stage of the lesion (often, indeed, in the later) that state of obstruction which chiefly indicates the operation, is often quite subordinate to those local lesions which cause the pain, tenesmus, and other signs of irritation present; so that there *is* a transit, and *is not* an accumulation, of intestinal contents at the intus-susception itself. The characteristic tumour, too, is a sign which belongs, not so much to the occurrence of intus-susception, as to its progressive increase of length, on the one hand, and to the enormous infiltration and swelling of its various layers, on the other. Hence, if the operation were deferred until after the access of this sign (indeed, if it were not practised almost instantaneously), it would generally be either rendered incapable of completion, by adhesion of the apposed coats of the middle and outer layers; or, in withdrawing the inflamed and rotten intus-suscepted portion, it would at the same time literally withdraw the patient's only chance of recovery. Moreover, but that I am persuaded no British surgeon of repute would gastrotomize a fellow-creature on the suspicion which mere tenesmus and pain would together afford, I could easily adduce grounds for the belief that intus-suscepted bowels are sometimes retracted by the natural

efforts of the tube. Lastly, not only is any difference in the fatality of this process, as it affects the different parts of the intestine, insufficient to justify our regarding their treatment by gastrotomy from different points of view; but we shall see that the somewhat greater danger inherent to invaginations involving the large intestine, is compensated by their being far more amenable to the milder operative treatment of reduction by enemata.

The next group of obstructions to eliminate from the discussion is one already alluded to—namely, that of the *strictures* and *tumours*, which experience shows to be chiefly (though not exclusively) related to the large intestine. Occupying this bowel in the great proportion of  $\frac{3}{5}$  of their total numbers; coming on gradually; and further suggesting an accurate diagnosis by their symptoms, on the one hand, and their signs accessible to an examination of the belly and the rectum, on the other; they are grouped (however unscientifically) by the practical considerations, that (1st) their nature may generally be recognised at once; and (2ndly), the operation indicated is that of opening the distended colon above the obstruction, and not gastrotomy: in other words, is palliative, instead of curative; safe and easy, instead of difficult and dangerous.

It is only as regards the date at which the operation ought to be performed that I would offer a passing remark. Granting that, in many of these cases, there is a history of previous attacks, which have yielded to ordinary measures without any operation;—granting that, even at the last gasp of the patient, the stricture may relax, the obstructive tissue may be removed by ulceration or gangrene, or the convoluted bowel may acquire a communication by sloughing with an adhering segment of the tube below the obstruction;—granting (what ought always to be borne in



mind) that the rate of the whole obstructive process differs in the two divisions of the intestinal canal, so that, on an average, it occupies from three to four times as long a period in obstructions of the large intestine as in obstructions of the small;—granting, too (what the operating surgeon is very unlikely to forget), that capital operations, in cases already foreseen to be fatal, cannot but be reluctantly undertaken, and, perhaps, the more so, that they excite a kind of prejudice against operative surgery in general;—granting all this would still leave two considerations, which are, I think, clearly suggested by the collected records of these cases. One is, that the administration of purgatives by the mouth (and even by the anus) has been made far too energetic and protracted a part of the treatment. The other is, that the operation has often been deferred to a period when there was no reasonable prospect of its being of any service at all. To judge how much inflammation is present must often be a difficult (if not impossible) task in the advanced stage of a case of obstruction. But the pathology and history of the malady concur to show, that any considerable amount of enteritis, and (*à priori*) of peritonitis, will generally render the relief of the obstruction (whether by dilatation of the stricture itself, or by penetration of the distended bowel) of no avail for the recovery of the patient.

As regards the operation itself, experience shows that there is so little to fear, that even supposing it performed in a case in which four-and-twenty hours more of agony and peril would have ended in a relaxation of the stricture, the patient is scarcely in a worse position for what has been so far an unnecessary interference. It would, perhaps, be invidious to suggest, that the delay seems sometimes ascribable to the dread of an inexact diagnosis—



especially to the risk of opening a distended small intestine mistaken for the colon. But asserting, as I unhesitatingly do, the facility and certainty of the diagnosis of these cases in general, I venture to ask whether there is not some analogy between the value of time in the relief, by operative interference, of complete obstruction of the colon and bladder respectively; and whether, in the main, our surgical brethren would not prefer the earliest and most indiscriminate puncture of the bladder by the rectum, to waiting for those appearances of urinary infiltration, to which, in the obstructed bowel, inflammation affords, in some sense, a practical parallel?

*Constipation*, properly so called, as implying the delay and impaction of fæces in some part of the large intestine, is not only a very infrequent cause of obstruction, but admits of a definite diagnosis. To provoke marked (not to say dangerous) symptoms of this kind, the accumulation must generally be so large and solid, that an examination of the belly and rectum would rarely fail completely to clear up the case, and to show that no such procedure as operation could be thought of. Indeed, this rule would equally apply to some interesting forms of partial obstruction,\* as well as to the rare cases of lead-poisoning which simulate this state.

It is chiefly as to contents other than fæcal that the group of obstructions formed by substances within the bowel raises the question of gastrotomy.

*Impacted gall-stones* we have found to be always of a size which implies their entry into the bowel by direct ulceration of the gall-bladder and duodenum, and therefore gives special characters to the previous history of the case. But there are many other impactions on record, in

\* See an Essay by the author in the 'Lancet' for 1855, vol. ii, p. 432.

which the history, symptoms, and necropsy, have alike shown a state such as would have greatly embarrassed the operator. A stricture, or a band, or a cicatrix, has caused a narrowing of calibre; and a plum-stone, a cherry, a piece of bone, a mass of undigested vegetable, or a plug of hardened fæces, has converted this narrowing into a fatal obstruction.

After all, however, how do these cases affect the operation of gastrotomy? Happily, they are few in number; scarcely more than one or two per cent. of the fatal, and a far smaller proportion of the total, cases of intestinal obstruction. Perhaps this rarity alone would entitle us practically to ignore them. But it is more to the purpose to point out that, while some of them appear to permit of little relief from any operation hitherto practised, the operation itself would sometimes increase, and never diminish, the patient's chance of recovery. Where a speedy death is, humanly speaking, inevitable, gastrotomy may be useless, but can scarcely be called dangerous or detrimental.

These considerations bring us to the only class of obstructions for which gastrotomy is, generally, suitable. Presuming that in any given case, the symptoms of which conclusively indicate an intestinal obstruction, the characteristics of invagination, stricture, and impaction of contents, are alike wanting, there is every probability that the case belongs to a group which, though its constituents are pathologically heterogeneous, is yet distinctly defined by its practical circumstances. In such an instance, the obstruction, for example, may be caused by a band of organized lymph, by an adhesion, a diverticulum, a rent in the mesentery, a malformation of peritoneum, a twisting of the tube, or (with a still rapidly decreasing frequency)

by a variety of other causes too numerous to mention. But whichever of these causes may be present, the resulting obstruction has two characters which amply justify the above grouping. Firstly, in its earlier stages, it may almost always be completely removed by an operation. Secondly, any spontaneous cure, akin to that which casts loose an intus-susception, is scarcely possible. So far as I can judge from all the records and preparations I have studied, such a restoration of the intestinal transit, thus interrupted, is one of the rarest contingencies in Pathology. If accumulation, distension, and leakage, fail to dilate the constricted segment against what is often the feeble pressure exercised by the band or adhesion, or to retract it from a peritoneal or mesenteric aperture into which it has slipped, death seems inevitable. Unless a fortunate position of the adjacent loops of intestine, and a still more fortunate concurrence of adhesion and ulceration, enable its contents to circumvent the obstacle; or unless the same general inflammation which permits the sloughing of the incarcerated bowel completes its channel by circumscribing an abnormal cavity—contingencies the rarity of which the statistics of hernia may enable us to estimate (and probably over-estimate)—the patient must, to all appearance, die.\*

But I think that, while gastrotomy ought to be restricted to this class of cases, it must not be regarded as their chief (far less their exclusive) remedy. For I am persuaded that the medical treatment which ought to precede this surgical attempt should not only always dictate the time of the operation, but would sometimes ob-

\* One or two such recoveries have to all appearance occurred in my own practice. Fortunately for the patients, however, the exact details of the process remain uncertified.



viate any such procedure, by curing the patient. And hence, deferring all further notice of its indications until this medical treatment has been alluded to, I shall only hint at some circumstances which render the operation, always dangerous, additionally unpromising.

Of *age*, as influencing prognosis, I can say nothing specific, the cases at my disposal not warranting any large general conclusion. But that in old persons, and shattered constitutions, a procedure like gastrotomy becomes additionally dangerous, it is almost a truism to state. And though it is difficult to appreciate the exact share of several motives for a decision, yet I must confess that the above circumstances have once or twice materially influenced me in deciding against the operation, in cases in which it might otherwise have been thought suitable.

A history suggestive of previous general peritonitis ought also to have some influence against the operation. Firstly, from its suggesting those diffuse and shallow adhesions, which (unlike the far commoner bands) would sometimes defy anything short of a protracted dissection to sever them. Secondly, from the number of bands which are sometimes present, and which an existing obstruction makes the source of a multiplied danger. The bowel, distended by one band, has thus been forced to assume a diameter, causing it to be secondarily obstructed by other bands behind or above the first. There are one or two instances on record, in which the condition of the original obstruction has been approached, with various gradations of intensity, by several other constrictions apparently of such secondary origin.

Violent inflammation of the obstructed bowel, and (*à fortiori*) any more general peritonitis, also tend to contra-indicate the operation. In respect to these lesions,

the importance of an early operation, and the value of relaxation of the muscular walls of the intestine and of the belly, as a diagnostic symptom of inflammation, cannot be too strongly insisted on.

One contingency connected with the operation can only be glanced at here. Supposing (what in most cases remains a possibility) that gastrotomy reveals such a state of the obstruction as defies its immediate relief:—a stricture of the small intestine, for example, instead of a band around it; or adhesive inflammation, preventing the discovery of the obstructed part; or local gangrene, forbidding all further search:—in these cases, the formation of an artificial anus is the alternative which would, perhaps, be generally adopted. But it may be questioned whether we might not find some means of avoiding the risk almost inherent in this operation, to the small intestine, by combining with it a procedure for speedily establishing an artificial communication between the bowel above and below the obstruction, and thus restoring a transit of contents through the greater part of the canal.

A ligature of catgut, or even a small ring of fine metallic wire, might (to judge by experiments on animals) thus be made the means of forming a new channel between the two nearest adjacent portions of healthy intestine, producing adhesive inflammation, and finally sloughing its way into the tube preparatory to its own transit and removal.

In the *Medical treatment* of obstruction, the chief object of all remedies—the protraction of life—may be regarded as suggesting two subordinate principles of treatment, which are conveniently distinguished as rational

and empirical; inaccurate, and even invidious, as these terms are, and little as the measures they severally suggest can be separated from each other.

The first of these principles is—the protraction, by every means in our power, of those pathological processes described in the preceding Lectures.

The most casual glance at the ordinary course of obstruction might well suggest, even though it could not substantiate, the value of gaining time. Our patient, for example, is stricken with what experience tells us is a dangerous disease, but one from which, up to the last moment of life, he may perchance recover. Hence, by so much as we can lessen the rapidity, and increase the duration, of his malady, by so much do we therefore multiply his chances of recovery.

But any such loose and inexact phrase falls far short of representing the true benefits derivable from protracting the course of obstruction. A careful inspection of the processes we have traced, together with some we have barely hinted at, not only brings this hazy, but perceptible, advantage into the clearest view, but at the same time assigns it much more important dimensions.

Observation and experiment, in Man and animals respectively, conclusively show that, other things being equal, the amount and rapidity of the distension to which obstruction gives rise, regulate the amount of pain and vomiting, as well as of the collapse which sometimes attends these symptoms only (compare p. 29). And the maximum and minimum duration of the whole process also seems often dictated by the same circumstance: a person dying, for instance, in twenty-four hours, with an enormously distended bowel; and an animal surviving for two or three weeks, and when at length killed for inspec-



tion, exhibiting a bowel which, though completely occluded, is otherwise little affected.\*

And if such considerations hold good of fatal cases, much more are they applicable to those processes by which Nature sometimes effects a cure of intestinal obstruction. Firstly, on clinical grounds, it is impossible to doubt that a complete restoration of the bowel to its healthy state often occurs. Even in that most fatal class of cases, in which the obstacle is verified after death as a fibrous band constricting the bowel from without, the history of the patient often conclusively shows that he has once or twice been in extreme jeopardy from attacks which have been precisely similar to the last mortal illness, and have yet left no trace in the bowel. And there can be no reasonable doubt, on analogous grounds, that even intus-susceptions do sometimes end in a "resolution" or retraction of equal completeness.

Now, without launching out into physiological questions which cannot here be discussed, I may point out that, while there seems to be no proof for, but much against, the view that intestinal obstruction can be produced (or, save in the equivocal instances afforded by some strictures and bands, or by gall-stones, even augmented) by active muscular spasm, this "resolution" of obstruction is explicable by some very simple considerations respecting muscular action in both striped and unstriped muscle. The peristalsis and dilatation an obstruction provokes are steps towards its removal—efforts of the *vis medicatrix Naturæ*. If the first cannot at once overcome the obstacle, the last, gradually accumulating a liquid mass, forms an active and passive agent of the most subtle and delicate

\* Compare the author, 'Contributions to the Physiology of the Intestinal Canal' (from the 'Med. Gaz.,' 1846), p. 22.

(but powerful) character. Gradually leaking into the stricture, it forms a kind of wedge here. And transmitting equally in all directions whatever force it may receive, it allows even the most distant wave of peristaltic contraction, applied (it may be) many feet from the obstacle, to tell with undiminished energy as an agent of dilatation here.

It would, perhaps, be pushing physical considerations too far to assert that increasing dilatation of the bowel adds a dangerous force to the total hydraulic pressure which peristalsis applies to the segment of intestine above the obstacle. It may suffice to point out the less questionable physiological effects of distension: namely, that it tends to paralyse the bowel it engages, and to interrupt and prevent, in the strictured part, that continuity of movement with the subjacent segment which is essential to the removal of these obstacles. In any case, an inspection of some of these obstructions shows, that they are so circumstanced, as that gradual distension, and active peristalsis, could together relieve or withdraw the bowel from all stricture; could sometimes even tear asunder the frail soft threads or adhesions by which that stricture is caused. And, conversely, whatever diminishes or protracts this inevitable process of distension, and thus restricts it to those moderate limits within which alone its results are salutary—whatever prevents the access of paralysis in the muscular wall of the bowel, or helps that wall, already more or less exhausted, to recover some of its pristine vigour—whatever does this will not only stave off death, in fatal cases, but will assuredly, in any large number of obstructions, often mediate a complete recovery.

Looking beyond this stage of obstruction, to the more dangerous, and less complete, cures, in which Nature removes the part affected, we still see the same pathological

law. Apart from the circumstances which (generally or casually) ensure the physical coaptation of the healthy segments of bowel adjoining the strangulation, it is in the moderation, protraction, and delay of the inflammatory process that we find the elements of safety. And thus distension, which visibly destroys the tissues of the obstructed bowel by a violence of the inflammatory process, traceable through all grades, from extreme congestion to downright gangrene; which not only prevents, but mechanically disturbs, that sequence (in time and place) of adhesion, organization, and ulceration or sloughing, necessary to remove and appose the diseased and healthy segments respectively; and which further arrests the peristalsis requisite to get rid of the putrid sloughy *exuvium* set free in the cavity of the intestine;—distension is, from all these reasons, still the *bête noire* of the story.

Did my plan permit, I could not only verify each of the foregoing statements by records of cases, but could even adduce various instances of the distension and disruption of the united ends of a segment of intestine obstructed by intus-susception many months before. Apart from such details, however, there is one fact which deserves notice, as having almost the value of a law in the casuistry of obstruction, and which, amply deducible from the records I have brought together, is remarkably confirmed by my own experience. The cases which recover are almost invariably chronic or protracted ones. Those intus-susceptions, for example, which end by the expulsion of the affected segment, have a duration from twice to thrice as long as that of the fatal cases; an estimate to which the marked symptoms of this process, and the anatomy of the expelled bowel, afford an impregnable basis. In like manner, in the numerous cases within my own experience,



in which unmistakable obstruction has ended in the complete recovery of the patient, it is only in the second, third, or even sixth week that I have witnessed that remission of symptoms, which announces the relief of the obstruction, and which often precedes by a day or two the first healthy alvine evacuation.

In accordance with the foregoing rational principle, the following seem the chief indications of treatment:—to prevent distension; to assuage pain; to mitigate excessive peristalsis; and to support the patient's strength during what is necessarily an exhausting, and often a long illness.

The means of furthering these objects scarcely require any detailed description. The avoidance of distension is to be attempted by reducing, in every available way, the quantity of food and drink, restricting the latter (so far as the often excessive thirst of the patient will allow) to small but frequent sips of cool (or even iced) liquids, and administering the former (in the shape of strong beef-tea, soup, or milk) with almost equal frequency and caution. With such articles, we may usefully alternate small doses of alcohol; preferably in the form of brandy, with water, or even soda-water. But inasmuch as the distension practically measures, not merely the danger, but the probable rapidity, of the case, the repugnance of the patient, or the instantaneous vomiting which these articles of food and stimulus often excite, must be met by a corresponding reduction in their doses. And it must often be a matter of great nicety to judge what is the proportionate urgency of these two antagonist suggestions for and against support, or how far one is to be subordinated to the other.

The other two objects—the alleviation of pain, on the one hand, and of undue or exhausting peristalsis, on the other—suggest the same kind of remedy; and it is only

as to the sedative to be adopted that there can be much difference of opinion.

On the whole, the preference usually accorded to opium is amply justified by its effects; and amongst these, by some which especially fit it for continuous administration during what is often the long progress of a case of obstruction, namely, its valuable stimulant properties, and the comparative uniformity and regularity of its effects. It is, in my opinion, best given alone, in the solid form, and preferably in the shape of the extract—a preparation which appears to be somewhat more uniform, both in its strength and its solubility, than the crude opium, whether administered in the mass or as a powder. In most forms of obstruction it may be administered, not only with safety, but with singular advantage, in quantities far exceeding those which would usually be regarded as suitable to the age or constitution of the patient. Indeed, in this direction, the practical limit of the dose, which is indicated by the comparative arrest of pain, will rarely be reached, save under circumstances which indicate the approach of narcotism, at least in so far as is shown by a decided contraction of the pupil. In the liquid form, the drug is generally much less efficient, being interfered with by the vomiting to a degree which leaves it doubtful what dose has really been retained, or, if not vomited, being more sudden, violent, and transient in its effects. In a word, it is comparatively unmanageable, or is even converted from the best of sedatives into a very bad stimulant.

As regards tobacco, the depressing influence, and the extreme local relaxation it causes, suggest its restriction to one or two administrations in the earlier stages of the malady—a period when experience indicates that it is sometimes capable of effecting the removal of an obstruc-

tion. It is rarely or never given save as an enema; and, owing perhaps partly to the very different susceptibility of different patients, partly to the very different strengths of different varieties of the drug, it even then often produces very alarming symptoms. Whatever may be the case in hernia, where there is a prompt and effective surgical resource lying, as it were, behind any such violent remedy, this circumstance forms an objection to the use of the tobacco enema in many forms of obstruction in which the inexorable logic of facts abundantly shows that the economising of the patient's strength by every available means is just as important as in a case of fever.

Belladonna, as a remedy in obstruction generally, may almost be regarded as offering a kind of alternative, according as its dose is small or large. If the former, it is a less active remedy than opium; if the latter, it is a far more dangerous one. In either case, it lacks the admirable stimulant effects of opium. As an enema, although there are cases on record in which its administration seems to have been attended with the best results, yet I do not think there is much to encourage its use. As in the case of opium, the more sudden and violent effect of an injection into the bowel, as contrasted with the solid extract given by mouth, renders it very difficult to select the full medicinal dose from which alone any immediate relief is to be expected.

There is only one form of obstruction in which the use of belladonna effects much, but in this its effects are sometimes admirable. The sufferings and the lesions produced by intus-susception depend, in great degree, upon the terrible forcing contractions of the intruded bowel, which not only continually increase the amount of displacement, but greatly further the congestive and inflammatory changes,



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which are, strictly speaking, secondary to the intus-susception itself. And opium (which, it may be recollected, not only causes the contraction of the unstriped muscle in the eye, but tetanizes the voluntary striped muscles of many vertebrata) may certainly be pushed to the verge of producing complete narcotism, without any diminution of this agonising straining peristalsis.

The combination\* of belladonna with opium seems no way to diminish the anodyne effect of the latter drug, even while it reduces this peristalsis almost to a zero. Certainly nothing in the whole action of remedies can surpass the comparative painlessness into which I have seen an agonising intus-susception converted during the many days that have intervened before its unavoidable termination in death.†

*Enemata* are another means of treatment of great importance. Constituting, as they do, a mode of introducing into the alimentary canal both the support and the sedatives already mentioned, they are practically of so much

\* I am aware that the two drugs are often supposed to be antidotes to each other. But though in stating facts I am not bound to explain them, I may point out that whatever general antagonism might be supposed to constitute the sum of special oppositions in their effects is quite compatible with a general agreement of the most valuable kind: so that, for example, they might agree in their anodyne property, differ mainly in their influence on the nerves of muscles, or on muscles themselves. In any case it is impossible to doubt experiences, which, like the above, at least prove that, mixed in certain proportions, neither drug loses much, if any, of its most important effects. The proportions I use are two parts of extract of opium to one, two thirds or one half part of extract of belladonna, in a pill.

† See a clinical lecture by the author in the 'Lancet' for April 11, 1863. In this case, in which a cancerous cæcum received an intus-suscepted ileum, three weeks of continuous suffering, unallayed by opium alone, were at once exchanged for three weeks of comparative ease. The effect of a temporary suspension of the belladonna abundantly confirmed its value.

more value in a third way, that we must often be content to restrict them to this latter office. In a degree varying, of course, with the situation of the obstacle, they permit the application of mechanical remedies, which, with proper precautions, can do no harm, and may, perhaps, remove the obstruction. Should a portion of them be retained any time, the water they introduce into the system is, of course, no contemptible aid to nutrition. And the substitution or admixture of milk or gruel confers upon them a further contingent usefulness, by permitting an absorption of other constituents of food. But their value chiefly depends on the chance of their gradually distending the bowel at the obstruction, and thus effecting such a change in the position or arrangements of its wall as may release the impacted or intus-suscepted part. The remedial effect of their warmth and moisture we need not discuss; but we may fairly presume its analogy to the known effects of external fomentations to inflamed parts.

As regards the administration of these enemata, I can but offer some suggestions. Firstly, that it ought never to be confided to an ordinary nurse, but should be regarded as an important operation, only safe and efficient if undertaken by a person of competent skill. In rare instances, inflammation renders any considerable injection of liquid into the lower bowel both agonising and dangerous, or even permits its transit through the stricture without allowing any return. In many cases, that tension of the belly, from which the patient suffers so much, offers a similar but less valid obstacle. Hence it is chiefly in the earlier stages of the malady that its use is most easy and promising. After arranging for the complete occlusion of the anus around the tube, the enema should be injected with extreme slowness and deliberation, waiting

from time to time until the effect of that slight increase of abdominal fulness which even an additional ounce or two of fluid can excite, has subsided, before attempting the introduction of any additional quantity. Injected in this way, little by little, a resolute patient will sometimes receive an enormous quantity of liquid before the operator finds the limit of injection is reached. And it is obvious that only by such a procedure, followed by as long a retention of the enema as the patient can afterwards manage, can an injection be expected safely to accomplish the mechanical removal of an obstruction. Indeed, there is little chance of this happy result unless the patient is determined to bear some pain, and the operator equally determined to inflict no more than he can help, in reaching that climax of distension at which only the enema is likely to remove the obstruction.

Is it of any real advantage to combine purgative remedies with these enemata? I firmly believe not. The mere peristalsis (apart from distension) of the bowel below the obstructed point is far more likely to do harm than good, by increasing constriction, and dragging upon the strangulated point. And any transfer of irritation, by sympathy, from the lower of these two segments, to the upper (or distended) one, is just as much to be shunned. The distension present is itself only too violent a stimulus—a stimulus which, in the earlier stage of the disease, excites violent contractions of the bowel, and, at a later period, only fails to produce the same effect by the extreme exhaustion and paralysis it has itself brought about;—a stimulus which it should, therefore, be our express object to mitigate and diminish, rather than to exalt by the addition of any new irritation.

And this brings me to the subject of *purgatives*, as ad-



ministered by the mouth—a subject on which I can hardly be sufficiently explicit, without pointing out how far the views I have now published and taught for several years modify those till then received.

That the enormously distended writhing intestine of a complete obstruction indicates the uselessness of all further attempts to relieve it by purgatives,—such is the proposition by which I may briefly sum up what has been said on this subject by Sir Thomas Watson, the first of our living writers on the practice of physic.

But I venture to think that the doctrines I have advanced will not so much follow this proposition into details, as change its whole purport, even while they confirm its practical value. Long before that advanced stage of obstruction which is thus made the turning-point in the administration of purgatives, nay more, long before that *fecal vomiting* which usually precedes it for some time, the physical examination of the belly shows an accumulation of liquid, and a creeping flatulent peristalsis, beneath its perhaps still smooth, relaxed, and flattened walls. And showing this, it indicates, not so much that purgatives are useless—for there is abundant clinical proof that they *may* be of service—but rather that Nature herself is preparing, within the obstructed bowel, the best of all purgatives—a mass admirably adapted by its quantity and quality, and especially by its consistence, to accomplish whatever any aperient can towards opening a passage. And if, as we have concluded, there is danger of even this stimulus being too great—of its distending the bowel with such rapidity as to paralyse its muscular coats, or to provoke an excessive and exhaustive peristalsis, or to excite a diffuse inflammation which so aggravates and distorts the local inflammatory phenomena as to destroy all

chance of their restoring the permeability of the obstructed canal—how much more have we reason to dread the distension caused by hydragogues, or the irritation of drastic cathartics! “Withhold purgatives,” I should say, were I addressing a class of students to whom I might justifiably speak *ex cathedra*—“withhold purgatives in these cases, not because the cases themselves are hopeless, for there is nothing to justify the inaction of despair. Some of these cases recover, and many may be treated successfully. But withhold purgatives, because they are not merely useless, but positively hurtful; hurtful not only in the late, but in the early stage of the obstructive process; not merely condemned by an experience which is sometimes equivocal, but contra-indicated by whatever rational principles can be deduced from the physiology and pathology of the malady. Or give them, if you give them at all, with a full warning that you are adopting a routine which, a few years hence, you will probably have to renounce and oppose; and which, in the mean time, your patients and yourselves will find an agonising and deadly substitute for clearness of insight, accuracy of diagnosis, and resolution of treatment.”

The introduction of a long, flexible tube through the rectum into the colon, is a measure which has been so strongly recommended, and constantly practised, that it is with some reluctance I express those opinions adverse to its use which reason and experience concur to suggest.

As a means of exploring the rectum, its very flexibility makes it far inferior to the ordinary bougie, which itself, in any but the most practised hands, seems liable to afford information somewhat equivocal, and is, at any rate, far surpassed, as regards the condition of those parts of the bowel within reach, by the easy and accurate knowledge



derivable from the ordinary digital examination. I am almost disposed to question the possibility of getting exact information about any moderate lesion of the rectum from the exploration which a flexible tube could mediate. And, of course, the comparative distance (if not inaccessibility) of the colon imparts tenfold weight to this anatomical doubt.

In like manner, I shall venture plainly to question (both as an old teacher of practical anatomy and as a physician) whether, in the vast majority of cases in which it is complacently stated that a considerable length of the elastic tube has been successfully passed into the colon, this bowel has ever been reached at all. I believe that in many, if not most, of these cases, the patient is saved from any such imminent peril as this procedure would imply, by the promontory of the sacrum, against which the tube impinges, and from which it is turned harmlessly back again into the parietes of the rectum, which receive and reject the enemata often subsequently administered through the tube thus introduced. Doubtless, too, the tube is sometimes similarly arrested by folds, displacements, or curvatures of the rectum, and has in this way again often suggested a higher or more complete introduction than has really taken place.

And while it is thus open to the objection of being (to say the least) a procedure which is both very uncertain and very difficult of application, in any real sense of the word, its dangers are neither few nor small, even in the most practised hands. That it has sometimes passed through a stricture without bringing any temporary (much less permanent) relief, and that it has even been known greatly to aggravate a patient's sufferings, by transmitting fluids which have increased the distension of the dilated



and paralysed canal above the obstruction, are in themselves no valid objections to its use; inasmuch as, whatever may have been the results in isolated cases, it is impossible to question the soundness of the principle which seeks to relieve stricture by dilatation, or the general efficacy of the application of this rule throughout the body. But as a means of administering the large dilative and distensive enemata already alluded to, the long elastic tube seems to have no special advantage over the ordinary tube of a few inches in length, which injects more gradually, and with less local and rude irritation of the obstructed part.

As regards the worst contingency of this procedure—the impinging of the elastic tube upon the actual seat of obstruction, and the consequent rupture of the inflamed or gangrenous tissues in this part or its neighbourhood—I must content myself with intimating that such cases have happened. Their total number I cannot estimate. The details of those known to me I respectfully decline to authenticate by any more explicit reference.

As calomel has been administered in intestinal obstruction under the belief of its possessing remedial virtues independent of its purgative characters, its claims, perhaps, deserve more specific consideration. Substantially, however, the history of its alleged successes amounts to little more than the relief of an obstruction, which for a short period had apparently defied other remedies, very soon after the administration of one or two full (and otherwise cathartic) doses of this drug.

Doubtless, these cases have been something more than mere coincidences, and have occurred (at least some of them) under circumstances which suggest at least a degree of causation. The remedy, if not the true cause of the

relief, has been, at any rate, the occasion of its occurring at that particular time; has been the *causa causativa*, if not the *causa causans*. In this point of view, however, I see nothing which entitles us to distinguish such an action of calomel from its strictly purgative properties; and, indeed, nothing by which we can distinguish calomel from various other purgatives, save perhaps in its greater activity, or in the greater frequency with which it has in this country been resorted to. And hence the objections which I should offer to its use may fitly include, in their application, various other remedies of analogous effect.

A patient, to all appearance dying of an intestinal obstruction, takes calomel, croton oil, or crude mercury, and forthwith recovers. "In plain English" (many would say), "he is cured." And any one who demurs to such a statement, apparently implied by these facts, or to the practice they recommend, is bound explicitly to state his objections.

I need hardly say that we are not here criticising the statistics of imposture,—the incredibly frequent pneumonia of homœopathic quacks, or the still more incredible reactions of matter in proportion to the quantity in which it is *not* present,—but the narrations of skilful physicians and surgeons, whose narratives are undoubtedly true, and whose opinions deserve the sincerest respect. It is possible that, in some of these cases, the diagnosis may have been erroneous; and that in others the relief experienced was an illustration of the "*post hoc, ergo propter hoc*." But in most instances it can hardly be doubted, both that obstruction was present, and that the action set up by the remedy speedily removed the obstacle.

But I believe that if such cases themselves are weighed dispassionately, there are other reasons for looking at them



with doubt. Interpreted by pathology, there is reason to suppose that the violent remedy only anticipated a natural result, which would have occurred less painfully and dangerously in a short lapse of time; or that it restored a peristalsis, which, under more suitable treatment, need never have been interrupted or exhausted at all. Still more do similar doubts suggest themselves as regards that mass of cases of which the successful event forms the true object of treatment. The occasional benefits of such remedies are outweighed by the fact that they not only often fail, but that, where they fail, they greatly reduce the patient's chance of recovery. Such a conclusion is equally deducible from recorded cases and from pathological considerations, which latter quite explain how that very aggravation of peristalsis and dilatation which rarely overcomes an obstacle frequently increases exhaustion, pain, and collapse; that it may burst the bowel; may prevent or destroy the adhesive process, and the chance of recovery this modification of inflammation sometimes affords; and lastly, may increase peritonitis and effusion.

Nothing can be clearer than that evidence in confirmation of these views, which a careful comparison of symptoms with the treatment has often exhibited to me in the progress of the same case. I have repeatedly seen the withdrawal of the systematic doses of calomel, or the suspension of some other aperient, at once ease pain, arrest vomiting, diminish distension, and reduce the inflammatory pulse, long before the commencing action of opiates has permitted any misinterpretation of the cause for the altered aspect of the case, or even where no opiates have as yet been administered at all. In like manner, I have seen the previous prognosis of death within a few hours—a prognosis which had been justified by everything in the his-



tory and progress of the case up to that period, as well as of all similar cases in the experience of those who gave it—agreeably disappointed as a result of the changed plan of treatment, and life prolonged through many days of comparative relief from suffering, even where the obstacle has not allowed (as it often has) of an ultimate restoration of intestinal transit; ending in a happy and unlooked-for recovery.

*Inflation* through the anus and rectum is another operative remedy, which, though its use has occasionally been attended with signal benefit, seems to be discountenanced by a consideration of the pathology of the malady, and by a comparison of the mechanism of the operation with that of the fullest injection of liquid. There are certainly instances on record in which an obstruction, having every symptom of an intus-susception, has been suddenly removed by an inflation of the patient's rectum with a pair of bellows, the relief having instantaneously followed that severe pain which complete distension brings about. And in one case this successful inflation was accomplished by successively injecting the solutions of the sesqui-carbonate of soda and of tartaric acid, so as suddenly to effervesce within the intestines of the shrieking patient.

Not having any personal observations of this kind to offer, I am disqualified from criticising such a procedure, save to point out that, while experience seems almost to limit its usefulness to intus-susception of the large intestine, it appears to be, on the whole, a more sudden and violent, but less manageable and powerful, distensive agent than a liquid enema, which, with reasonable care, may easily be made to fill the whole large intestine, as far as the ileo-cæcal valve, without inflicting upon the patient any danger, or even much suffering. Indeed, it has

already been mentioned that, in the early stage of obstruction, the quantity in which such an enema can be introduced, and the state of the belly during its presence in the large intestine, materially help to fix the locality of the obstruction, by deciding whether it is, or is not, above the ileo-colic valve.

Crude mercury is another remedy to which the best effects have often been attributed, and by which one can hardly doubt obstructions have sometimes been relieved. But I should strongly urge its disuse, not only because its successes are enormously outweighed by its failures—especially if we deduct (as I am afraid we ought) some of the supposed successes as mere coincidences of its administration with the patient's recovery, and others as cases in which an error of diagnosis has caused it to be given when no mechanical obstruction was present—but much more because it often seems to do harm, embarrassing the bowel, and increasing the distension and pressure already disposing it to paralysis, inflammation, and gangrene.\*

I need say little respecting such measures as counter-irritants and fomentations. Unless specifically called for by inflammation, it is difficult to see what the former can

\* A better remedy of this kind was mentioned to me by a patient some years ago, as having cured him of an obstruction for which he had been "given over" by his professional advisers. In this desperate state an old woman was called in—apparently from her known success in the treatment of this, or some similar, malady. The nostrum she gave was a soft mass, obtained by boiling down ordinary Zante currants with a very small quantity of water. Here, again, I have no experimental right to a conclusion. But I may point out, that the administration of such a remedy would promise many of the advantages expected from crude mercury; if, indeed, the softer and more equable distension it might perchance produce would not be a more energetic (as it certainly would be a safer) mechanical agent to apply to the obstructed part. It is, perhaps, worth trying in lead-colic.



effect. On the other hand, the comfort sometimes afforded by the latter suggests (or rather confirms) their usefulness. Wet cloths, cold affusion, and other varieties of the application of water, are occasionally of service. Where distension is excessive, a bandage is often felt as a relief, and sometimes seems to have a more definite value in moderating the throes of pain and peristalsis, by its influence on the really co-ordinate contractions of the belly and intestine.

And though any statistical comparison of the two plans at present quite fails us, I venture to anticipate, from personal observation, that such a comparison would afford striking proof of the superiority of the treatment I have advocated. Nay, more, I hazard the prediction that it will hereafter be proved so. Not because I have long advocated it. Not because its every detail has been matter of careful consideration, gradually ripening into strong conviction. Not even because the drift of professional opinion has evidently for some years past shown signs of setting into this channel. But rather because I believe it to rest upon a scientific basis—upon physiological and pathological foundations both wide and deep; because it seems to me to offer an illustration of the immortal law, "*Natura enim non nisi parendo vincitur*;" and to show that in a disease often incurable, always dangerous, Providence has still confided to us the lives of our fellow-creatures;—teaching us how, by studying his own body, Man may often remedy one of its stormiest diseases, just as, by studying inanimate Nature, he may, with means no less simple and apparently inadequate, avoid the whirlwind, guide the avalanche, put back the glacier, attract the fertilising rain, and control the devastating flood. Comparing the duties we have to perform with some of these tasks,



and with others which, though strictly medical, the individual cannot undertake, and the social organisation called Government is only beginning to count amongst its functions—the directness and readiness of the means we wield in this, one of the most agonising and deadly of all diseases, may well mingle gratitude with those feelings of reverence and responsibility which animate the incessant toil, and the scarce less incessant distress for others, of the Physician's life.

The following is a summary of the treatment suggested by the foregoing remarks for the several forms of obstruction :

In intus-susception of the large intestine, repeated injections of liquid into the rectum, so as to distend the bowel to its utmost dimensions.

In stricture of the large intestine, the institution of an artificial anus above the obstacle.

In obstruction from bands, diverticula, &c., mostly affecting the small intestine, gastrotomy, and division of the cord-like cause of strangulation; a procedure which, if interrupted by unforeseen impediments, may further require the institution of an artificial anus in the most distended part.

In obstruction by stricture, however, a tobacco enema should be administered at least once; a measure which should be repeated, if need be, in obstruction by bands, and especially by gall-stones.

In all cases, opium and support to be freely administered from the earliest stage of the malady. The bulkier liquid constituent of the food to be given as sparingly as possible by the mouth, but administered freely per anum. Distensive enemata to precede all operations, if only as a

means of aiding or assuring diagnosis. Where vomiting is excessive, nourishment to be also injected into the rectum in small and frequent doses.

After recovery, all food which can introduce indigestible substances into the intestine should be carefully avoided; the bowel having sometimes undergone changes of calibre and arrangement such as permit substances easily transmissible through the healthy canal to cause fatal obstruction.

## NOTE BY THE EDITOR.

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A MOURNFUL interest is attached to this work. The mode of its publication had been determined upon; the manuscript, finished even to the preface, was in the printer's hands, and some of the sheets had been corrected, when the untimely death of the author put a stop to his personal completion of a work in which he took peculiar interest. For the subject of "Intestinal Obstruction" had been associated with Dr. Brinton's name from the outset of his career. So early as the fourth year of his student life, he had commenced a study of the process by which fæcal vomiting is effected, and which at that time was supposed to depend upon an "anti-peristaltic" movement of the intestinal canal. The conclusions at which Dr. Brinton arrived, after the most careful consideration and repeated experiment, were embodied in a paper which was read before the Royal Society on December 21st, 1848, being introduced by his teacher in physiology, the late Dr. R. B. Todd. The paper is entitled "Contributions to the Physiology of the Alimentary Canal," and consists of two parts, having a real relation to each other, though apparently little connected. The first is "On the Movements of the Stomach." In this the author sought to



establish a general law to the following effect:—That transverse contractions occurring in a closed tube filled with fluid, and proceeding in *one* direction only, imply two currents, a peripheral of advance taking the same course as the peripheral contractions, and an axial of return in the opposite direction. The second is “On the Physiology of Intestinal Obstructions.” In this an analogy is drawn between an intestinal tube blocked by disease or experiment and the stomach itself. Fæcal vomiting is explained as a result of the axial current of return set up by violent peristaltic action in a closed tube filled with fluid. The theory of “anti-peristalsis” is met by the objection that, whilst evidence of its occurrence is wanting, there is no reason even for presuming its existence as explanatory of a phenomenon which receives a less difficult and more probable solution in the mode described by the author.\*

In April, 1859, Dr. Brinton delivered the Croonian Lectures before the Royal College of Physicians. In choosing as his text the pathology and treatment of “Intestinal Obstruction,” he was influenced by the circumstance that the subject had long occupied his attention, and the hope that he might be able to afford useful information upon it. That he succeeded in his object there can be no doubt. His Lectures, published at the time in the ‘Lancet,’ were widely read, and the truth of the views enunciated generally acknowledged. As an illustration of the notice which they attracted, it may not be out of place to quote an expression of opinion concerning their author from the present President of the College, Sir Thomas Watson, Bart.:—“We met,” he writes, “not

\* It is unnecessary to give further details here, as the subject is dwelt upon very fully at page 8 *et seq.* of the present work.

seldom in consultation; most often in cases of intestinal obstruction. Of that terrible disease the whole pathology and the true management had been most lucidly settled by his acute and inquiring mind.”\*

The motives which induced Dr. Brinton to reproduce the substance of these Lectures in their present form are set forth in the preface. It only remains to add, that the task of editing the work which the author entrusted to me has been a very simple one. The press has been corrected, and headings have been furnished to the pages, &c.; but I have abstained from any interference with the subject-matter of the work, which is thus presented to the reader as it issued from the author's hands.

I have preserved notes of three cases of intestinal obstruction which have occurred in my own practice in the course of the last ten years, and which have not hitherto been published. The details of the first case I supplied to Dr. Brinton many years ago, and, as he expressed his interest in it, as well as in the others which were the subject of conversation between us, I have thought that they might without impropriety be quoted here. They illustrate very well the advantage belonging to the kind of treatment which is advocated in the present work; and possibly the fact that they are derived from the experience of an independent observer may lend the observations some additional value as corroborative of many of the author's views.

CASE 1.—Elizabeth A—, widow, æt. 40, laundress. On

\* See ‘Lancet,’ Jan. 26, 1867, “Memoir of Dr. Brinton.”

the evening of April 8th, 1857, after an unusually hard day's work at the washtub, she was suddenly seized with a very sharp griping pain across the belly, followed, a quarter of an hour afterwards, by vomiting. Her bowels had been opened in the morning. The pain continued almost without intermission, and she vomited after every description of food up to the time when I first saw her, which was on April 10th, at 7 p.m. She then lay on her back, with the knees drawn up. If she turned on either side vomiting immediately occurred. The pain, which had rather increased than diminished, she referred to the region of the navel. Her face had an extremely anxious appearance, and was bathed with perspiration. The pulse was 128, and feeble; the act of coughing only slightly increased the pain; her belly was somewhat swollen, generally resonant on percussion, in the neighbourhood of the navel being absolutely tympanitic; it was soft and flaccid, and not tender upon pressure; the vomited matter at that time consisted of a brown fluid, with flocculi of the same colour, of a sour and very offensive but not feculent odour; the tongue was dry and chipped; her bowels had not acted for sixty hours; there was no hernia. She was ordered to take half a grain of crude opium every four hours, and a teaspoonful of good beef-tea very frequently.

April 11th.—Pulse 114; has slept but very little during the night; she thinks the pain is rather less severe this morning; her head aches, and she feels bewildered; she has not vomited quite so much, but she complains greatly of the horribly offensive taste of the ejecta; her tongue is tolerably moist, and slightly furred at the base; skin warm and covered with perspiration.

To continue the opium, &c.

12th.—Pulse 90; pain not quite so sharp; bowels still



unrelieved ; the vomited matters, she says, are still more filthy to the taste ; her tongue is dry and chipped ; belly more tumid and resonant.

Continue opium.

13th.—Pulse 98, more full and bounding ; tongue red and chipped, moist at the tip, slightly furred, and yellow at the sides and base ; vomiting continues. The fluid thrown up is now yellowish-brown in colour, and decidedly feculent ; this change occurred at noon to-day. She has not slept at all ; she feels certain that she cannot recover.

Continue treatment.

14th.—Pulse 96, feeble and jerking ; tongue tolerably moist and chipped ; the feculent vomiting still continues ; the pain, she thinks, is not quite so bad as it was ; she feels very sleepy, but cannot sleep.

At 7.30 p.m. I learnt that she had passed a motion, which I did not see, as it had been thrown away. Her tongue is now very red ; the pain is decidedly lessened ; she has vomited but little during the day, and not at all since she had the evacuation ; she feels dreadfully weak.

Continue opium and beef-tea.

15th.—Pulse 100, quiet and good ; tongue not so red, more moist, slightly furred at the base ; has only vomited twice since last seen, and then the quantity thrown up was small, and not quite so offensive ; she complains of tenesmus.

Continue opium, &c.

Evening.—Pulse 90 ; has had two motions during the day, copious, slate-coloured, and semi-fluid ; has not vomited.

16th.—Pulse 108 ; has had another motion, consisting of thick, creamy fluid, of brownish-yellow colour, containing small lumps of feculent matter ; pain now much less

severe; tongue red and moist; does not sleep at all; feels dreadfully stupid and lifeless; there is great soreness and sensation of bruising all over the belly; there is great difficulty in swallowing, accompanied by pain in the throat and pit of stomach, extending through to the back between the shoulders; her urine, which is abundant, scalds her; skin cool; does not vomit at all.

Discontinue the opium; take beef-tea, arrowroot, and milk.

17th.—Pulse 104; tongue moist; fears she is not getting on well; says that the pain in her chest is dreadful when she swallows anything; she has pain of a tenesmus character in the belly; bowels have been moved four times during the last twenty-four hours. I am shown half a potful of very dark brownish-green fluid, with small lumps of fæces of a powerful odour. She scarcely ever sleeps, only dozing for a few minutes now and then; feels dreadfully weak and low-spirited; her stomach “goes as if all afire” directly she swallows anything; has not vomited.

18th.—Pulse 114; tongue red, moist and clean, not furred; has slept but very little; she says that as soon as her eyes are closed she has a sensation of everything whirling about; bowels have acted three times; motions fluid, of a dark brown colour; swallowing not quite so bad; her speech is rather thick, and she feels “tipsy.”

19th.—Pulse 104, full; tongue red and moist; she slept rather better last night; took some broth to-day, with a very small piece of mutton; her swallowing is improved; she seems less confused; early to-day had a motion like that last described; does not vomit.

20th.—Pulse 100; still improving in every respect.

21st.—Pulse 102; very low-spirited; her bowels have

been very much relaxed all night; has now no pain in the belly.

After this she continued to improve daily, and on April 25th she had completely recovered.

No accurate diagnosis with regard to the seat of obstruction was made in this case, and the patient's recovery necessarily leaves the matter in doubt. The rapidity with which vomiting succeeded the occurrence of sudden pain, and its long persistence, point, I think, to the lower part of the small intestine as the probable seat of an invagination which terminated by natural resolution. No purgative was administered to this woman throughout her illness. She took opium at four hours' intervals for six days; under its influence she scarcely ever slept, but the bowels were relieved for the first time on the seventh day of the attack, and afterwards acted copiously without assistance.

CASE 2.—Thomas L—, æt. 22, a French-polisher. On February 17th, 1860, he was occupied all day in polishing a shop-counter, which obliged him to lean far over, at the same time using great exertion with both arms. In the evening he felt a sudden, very sharp pain in the right iliac region, followed by vomiting, which continued to recur from time to time. On the following day he went to work, but suffered much distress. On the 19th he walked about during the day, and in the evening the pain was excessive. He took some castor-oil, which acted and caused great pain of a dragging character about the right hip-joint.

He obtained medical advice on the 20th. Leeches were applied, and purgatives as well as enemata administered, the former of which produced no result, the latter very



little. His condition grew rapidly worse; the pain was excessive, and the vomiting continuous. On the 23rd a grain of opium was ordered by his medical attendant to be taken every three hours.

I saw him on the 24th, his friends being much alarmed and, for some reason or other, dissatisfied with the attendance. He was lying on the back, with the legs drawn up; face pale, and expression very anxious. His pulse was a mere quivering thread, felt with difficulty, and impossible to be counted. The abdominal muscles were rigid, and there was exquisite tenderness on pressure over a small space in the right iliac region, about two inches above the centre of the groin. He had no hernia. A grain of opium was ordered to be continued every four hours, and a teaspoonful of brandy in water every hour.

On the following day I found his condition much as before. He despaired of recovery. The vomiting continued, and there had been no action of the bowels; there was frequent sighing, and he complained of great oppression at the pit of the stomach. On the 26th there was some slight improvement in the pulse, the other symptoms continuing. In the evening he passed a loose, dark-coloured motion. He was considerably better on the 27th, and he passed four or five motions of a dark brown colour, the consistence of thick cream. On the 28th the belly was very tympanitic, and his breathing embarrassed thereby. There was less tenderness on pressure over the right iliac region, but he complained of pain in the corresponding part of the *left* side; vomiting ceased, and his bowels were freely relieved five or six times. During the night he suffered much from tenesmus. On the 29th there was great tenderness in the left iliac region, frequent

tenesmus, and increased general distress. I found that he had been eating some toast, contrary to express orders against any solid food. His relapse was, however, only temporary, and from this time he gradually improved, and on March 4th was convalescent.

This man took sixty grains of opium in the course of ten days; whilst under its influence his bowels were moved nineteen times. I learned during my attendance that about a twelvemonth previously he had suffered severely from an attack which his friends described as very similar in character to the present one.

Eight months after this, on the 6th of November, 1860, I was again sent for to see this patient. He had been in good health during the summer, and constantly following his occupation. He informed me that for some time after the attack described he used to feel a *dragging pain in the right side of the belly* after emptying his bladder. His bowels had been tolerably regular; he generally succeeded in getting a motion daily without medicine. For the last day or two, he said, he had been feeling uneasy, "as if he were going to be ill again."

This morning (November 6th) he went to work as usual, but was forced to knock off at noon, on account of violent pain in the right iliac region. He has vomited after almost everything swallowed. His bowels have not been moved for the last two days. He lies with his legs drawn up; expression of face very anxious; pulse 96, small. His belly is tender to the touch about the right iliac region, tympanitically resonant generally, except over the seat of pain, where for a space of two or three inches square there

is dulness. He was ordered to take one grain of opium every four hours.

November 7th.—In much the same state. He still vomits, and there is no action of the bowels. Two pints of gruel were injected into the bowel. Four hours afterwards there was a very slight action, apparently the contents of the lower bowel only.

8th.—He had no sleep during the night. The pulse was 110, small; his expression very anxious. Abdominal symptoms continue unchanged; the vomiting persists; pupils rather large.

9th.—He slept last night, and has vomited only once. He continued to improve on the 10th and 11th. On the 12th his bowels were opened once. The opium was still continued every four hours. Next day the bowels acted four times freely, the motions being loose, and of dark colour. On the 14th his tongue was cleaning, and he was nearly free from distress. The bowels were acting freely, and any pain experienced in the right iliac region was relieved by the passage of flatus. I have no further note until December 1st, when he was able to call upon me quite recovered.

During this attack the patient took forty-six grains of opium in the course of eight days, and, as before, under its influence, the bowels commenced to act copiously. The attack was shorter in duration and less severe than on the former occasion—a result which may, I think, fairly be attributed to the treatment. The administration of opium was commenced very early, and no purgative was given.

The vomiting in this case, although it was offensive, could never be described as actually faecal in character. Taking the history into consideration—the three serious



attacks referred to—it seems most probable that, either as a result of the first of these three attacks, or of some previous illness attended by inflammation, a band of organized lymph had been produced in the peritoneal cavity, ready to entrap a segment of small intestine when circumstances should favour the accident. This took place in February, and obstruction with its attendant enteritis resulted, the peritoneal inflammation spreading on that occasion to the other side of the abdominal cavity. He recovered, but the dragging pain, of which he long afterwards complained, in the right iliac region, after emptying his bladder, would seem to indicate an attachment to the fundus of that viscus. There was still the risk of a repetition of the accident, and this, indeed, occurred in the following November.

CASE 3.—Hannah B—, æt. 51, occupied in household duties. On April 21st, 1862, after carrying a heavy pail from the top of a house to the bottom, she felt “something give way,” followed by an inclination for stool, which was ineffectual except for the passage of wind. Intense pain then came on in the right side of her belly, and she vomited. I saw her soon afterwards; she indicated a spot a little below the margin of the ribs, in the right iliac region, as the seat of pain. She bore all the aspect of a patient suffering from strangulated hernia; but there was no lesion of this nature. The pain was described as of a twisting character, and vigorous contractile efforts of the bowel were perceptible to the hand. Vomiting was occurring at frequent intervals. She was ordered a grain of opium every four hours. On the two following days her symptoms continued unchanged, and her distress was very great. On the 24th the vomiting had ceased; there had

been no relief to the bowels. Examination of the belly showed a circumscribed projecting swelling, ovoid in form, in the right iliac region, extending obliquely upwards and to the left side. It quite stood out from the general wall of the belly, and gave the idea of being formed by the ileum distended near the ileo-cæcal valve. The patient was in a state of collapse. The opium was continued at the same regular intervals; the vomiting did not return; wind was occasionally passed by the bowel, but no motion took place. For several days this state of things endured, and she suffered some distress of a nervous character, possibly attributable to the opium. She complained of lumps in her throat, which threatened to choke her, and on several occasions her jaw became nearly luxated, so that, with a great inclination to yawn, she feared to indulge in it. On the 29th she retched several times in the morning; there was circumscribed tenderness in the right side of her belly; she was somewhat delirious at night. The secretion of urine was throughout very scanty. The tongue, which during the first part of her illness was much furred, became perfectly clean and moist by May 5th. On that day it is noted that she is feeling a little stronger, and less uneasiness; she keeps down the beef-tea and brandy, which besides the opium is all that she is allowed to take. On the 6th she suffered pain of a forcing character, and in the evening the bowels were opened once. The following morning they were again relieved, the motion on each occasion being dark brown in character, and semifluid. She now began to feel some appetite, and bread with butter was allowed her; the opium to be taken only every eight hours. Between the 7th and 8th she was purged nine times copiously; after this she rapidly improved, and in a few days had quite recovered.

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